

The location dynamics of knowledge-based service establishments: A Stellenbosch case study

by

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Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part, submitted it at any university for a degree.



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18/02/2009

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Abstract

Issues relating to globalization and the rise of the New Economy have received much attention from academics. Renewed emphasis has been placed on the importance of locality and cities are seen as gateways to ensuring a competitive role in the global economy. In South Africa, local economic development (LED) approaches are increasingly reflecting market-driven entrepreneurialism as cities compete to attract investment. This has, however, caused the decline of economies of already lagging regions, widening regional disparities. Statistical evidence confirms the opinion that the service sector has become a leading contributor to national and regional economic growth, both internationally and in South Africa. Synonymous with the knowledge-based economy is the dependence of this sector on innovation and highly skilled human capital as drivers of competitiveness and development. As a result, the role of universities as producers of knowledge and educated labour has received much attention. The perceived geographic “footloose” nature of knowledge-based industries has also led some to believe in their potential to reduce the disparities between cities and small towns or peripheral locations. Evidence show, however, that knowledge-based service industries still tend to cluster in major metropolitan areas. Though the importance of the knowledge-based service sector has been acknowledged by academics and government, a lack of empirical research still exist on the decision-making processes determining the choice of location of South African companies. Research has indicated the medium-sized town of Stellenbosch in South Africa to have a high level of growth potential. The town is also the location of a well-established IT and knowledge-based service sector. For the purpose of this study, a database was compiled of a research population of 329 knowledge-based service industries operational in Stellenbosch, after which surveys were distributed amongst the entire population. Data generated from 104 completed questionnaires provided a deepened understanding of the nature of these industries of which the majority is single-branch businesses situated in Stellenbosch due to the fact that it was the owners or key role players’ home town during the time of establishment. Other notable trends such as the growth in the number of international head offices in the knowledge-based service sector, the availability of highly skilled labour, and proximity to important clients, further highlights the reasoning behind the decision of knowledge-based companies to locate in Stellenbosch specifically. Finally, the existing linkages between Stellenbosch University and these industries - specifically the IT and engineering sector - receives attention.

Opsomming

Vraagstukke wat verband hou met globalisering en die ontwikkeling van die Nuwe Ekonomie het reeds heelwat aandag van akademici ontvang. Hernude klem is geplaas op die belangrikheid van ligging, en stede word gesien as instrumenteel in die proses om 'n mededingende rol in die globale ekonomie te verseker. As gevolg van stedelike mededinging met die doel om investering te lok, reflekteer plaaslike ekonomiese ontwikkeling (PEO) in Suid-Afrika toenemend markgedrewe entrepreneurskap. Dit lei egter tot die ekonomiese agteruitgang van areas wat reeds 'n agterstand beleef, met die gevolg dat streeksongelykhede verder vergroot. Statistiese bewyse bevestig die siening dat die dienssektor 'n vername bydraer tot streeks- en nasionale ekonomiese groei geword het, beide op internasionale vlak en in Suid-Afrika. Sinoniem met die kennisgebaseerde ekonomie is hierdie sektor se afhanklikheid van innovasie en hoogs opgeleide menslike kapitaal as dryfkrag vir mededinging en ontwikkeling. Die rol van universiteite as skeppers van kennis en voorsieners van 'n opgeleide werksmag het dus al aandag geniet. Sommige is van mening dat die oënskynlike geografiese “ongebondenheid” van kennisgebaseerde industrieë hulle die potensiaal gee om ongelykhede tussen stede en klein dorpe of randareas te verminder. Daar is egter bewys dat kennisgebaseerde industrieë steeds geneig is om in hoofmetropolitaanse gebiede te konsentreer. Hoewel akademici en die regering die belangrikheid van die kennisgebaseerde dienssektor erken, bestaan daar steeds 'n gebrek aan empiriese navorsing rakende die besluitnemingsprosesse wat die keuse van ligging van Suid-Afrikaanse maatskappye bepaal. Navorsing het getoon dat die medium-grootte dorp van Stellenbosch in Suid Afrika oor 'n hoë vlak van groeipotensiaal beskik. Die dorp word ook gekenmerk deur 'n goedgevestigde IT- en kennisgebaseerde dienssektor. Vir die doel van hierdie studie is 'n databasis saamgestel bestaande uit 'n navorsingspopulasie van 329 kennisgebaseerde diensindustrieë werksaam in Stellenbosch, waarna vraelyste onder die hele populasie versprei is. Data wat uit 104 voltooide vraelyste gegeneer is, het gelei tot dieper begrip van die aard van hierdie industrieë, waarvan die meerderheid enkel-tak besighede in Stellenbosch is, voortspruitend uit die feit dat dit die eienaars of hoofrolspelers se tuisdorp was tydens die vestiging van die besighede. Ander noemenswaardige neigings, soos die toename in die aantal internasionale hoofkantore in die kennisgebaseerde dienssektor, die beskikbaarheid van hooggeskoolde arbeid, en die nabyheid aan belangrike kliënte, werp verder lig op die besluit van kennisgebaseerde besighede om spesifiek in Stellenbosch te vestig. Laastens, word die

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Acronyms

ASGISA	Accelerated and Shared Growth Initiative of South Africa
CBD	Central Business District
CIPRO	Companies and Intellectual Property Registration Office
CTP	Cape Town Partnership
CWDM	Cape Winelands District Municipality
DACST	Department of Arts, Culture, Science and Technology
DM	District Municipality
DTI	Department of Trade and Industry
FIRE	Finance, Insurance and Real Estate (Services)
GDP	Gross Domestic Product
GDPR	Gross Domestic Product per Region
GEAR	Growth, Employment and Redistribution (Strategy)
GIS	Geographic Information Systems
GPG	Gauteng Provincial Government
GPS	Global Positioning System
GVA	Gross Value Added
ICT	Information and Communication Technologies
IDP	Integrated Development Plan
IT	Information Technology
ITC	Information & Communication Technology
KIBS	Knowledge Intensive Business Services
LED	Local Economic Development
MEDS	Micro-Economic Development Strategy
MM	Metropolitan Municipality
NRTA	National Research and Technology Audit
NSDP	National Spatial Development Perspective
NSI	National System of Innovation
OECD	Organisation for Economic Co-operation and Development
PER&O	Provincial Economic Review and Outlook

PGDS	Provincial Growth and Development Strategy
PSDF	Provincial Spatial Development Framework
R&D	Research and Development
RSC	Regional Services Council
SADC	Southern African Development Community
SACRO	South African Companies Registration Office
SAPTO	South African Patents & Trade Marks Office
SIC	Standard Industrial Classification
SME	Small- and Medium-sized Enterprise
SU	Stellenbosch University
WCPG	Western Cape Provincial Government

CHAPTER 1: INTRODUCTION

1.1 SETTING THE SCENE

With the dawn of the new democratic era that followed the demise of the apartheid regime, the new South Africa faced its crucial reintroduction to the competitive international arena. Fuelled by the forces of globalization, the New Economy, as it has come to be known, has since been placing increasing pressure on South Africa as developing country to compete with its developed counterparts in efforts to obtain the investment necessary to stimulate economic growth. With greater accessibility to global markets as a result of the removal of trade barriers, renewed emphasis is being placed on the importance of locality, resulting in increased competition between both local and international cities and a widening gap between urban and peripheral or rural areas. Also synonymous with the New Economy is the role of knowledge and innovation as catalysts for the economic development of countries and regions. The rising dependence on human capital and flexible production has come at the expense of investment in physical resources and rigid systems of mass production that characterised most of the 20th century. Inherent to this new post-Fordist era, is the rising importance of the service sector in driving economic growth, with specific emphasis on knowledge-based service activities.

The service sector is responsible for the provision of intangible commodities primarily produced by people (Daniels 1985; Howells 1988; Marshall, Wood, Daniels, McKinnon, Bachtler, Damesick, Thrift, Gillespie, Green & Leyshon 1988). Broadly defined, the knowledge-based service industry refers to a specialised subset of the service sector that provides services which involve complex intellectual and knowledge-intensive activities for which the dominant production input is skilled human capital (Aslesen & Jakobsen 2007; Shearmur & Doloreux 2007). These more durable activities, greatly dependent on a highly-educated labour force, can be distinguished from less knowledge-intensive, more perishable services such as security agencies, office cleaners and delivery services (Daniels 1985). The intricate nature of service industries have afforded this sector comparisons ranging from “the glue that holds any economy together” (Riddle 1986: 26) to “the Cinderella of economic geography” (Daniels 1993: 1). The significant growth of the service sector is closely related to a new division of labour and fast

technological change. Some believe developments in information and communication technologies (ICT) have allowed knowledge-based firms the freedom to locate in peripheral locations. However, the perceived locational flexibility of service industries has become the centre of vigorous debate regarding the potential of this sector to even out the economic disparities between rural and urban regions. The dichotomy between the footloose nature of these industries and the spatial concentration of service activities in urban centres also has relevance in the South African context, where economic policy initiatives are increasingly taking on regional development perspectives (Cornelissen 2006).

With the optimistic international attention given the subject, the knowledge-based service sector in South Africa demands in-depth research. To successfully compete in the global economy whilst simultaneously preventing increases in regional disparities, it is necessary to shed light on the nature and extent of the knowledge-based service sector in South Africa. This includes the identification of the locational dynamics that control the geographic concentration of industries, and harnessing the potential of service activities to contribute to economic development in a way that supports cities, smaller towns and peripheral localities.

1.2 PROBLEM FORMULATION

The proposed study focus emanates from a provincial policy directive to engage in in-depth research of aspects of town growth potential in the Western Cape province. Recommendations from research relating to the growth potential of towns in the Western Cape which was undertaken on behalf of the provincial government by the Stellenbosch Centre for Geographical Analysis stated that “further investigation...[is needed] to unpack...profiles [of individual towns] in greater detail to expose... local situations” (Van der Merwe, Zietsman, Ferreira, Davids, Swart & Kruger 2005: 137). Stellenbosch was identified as a leader town with a high level of growth potential but more research is necessary to determine causes of town development.

Leader towns lying within Cape Town’s sphere of influence compete to benefit from spill-over effects of investment in the metropole. Stellenbosch has become the location of many knowledge-based service industries, including national and international company headquarters and an extensive information technology (IT) service industry (Rogerson 2000). However, a lack

of knowledge exists regarding the motivations behind the decisions of companies to locate in Stellenbosch. The dynamics of the locational decision-making process undertaken by Stellenbosch-based service establishments is of particular interest when considering the town's proximity to Cape Town and other small towns and suburbs peripheral to the city. Furthermore, the extent to which knowledge-based industries contribute to Stellenbosch's position as leader town in the Western Cape has not been established. It is therefore necessary to determine the nature and extent of the service sector in Stellenbosch, and also to consider the potential synergy that may exist between knowledge-based service industries and the University of Stellenbosch as a result of their close geographical proximity. The significance of the proximity of knowledge-based service clusters to large tertiary institutions is particularly meaningful considering the dependence of service industries on knowledge spillovers and innovation, and the role of universities in knowledge production, R&D and the provision of a highly educated workforce.

1.3 AIMS AND OBJECTIVES

Three main aims are embedded within the research problem:

- To identify the nature and extent of the Stellenbosch service sector.
- To establish what factors motivate knowledge-based service industries to choose Stellenbosch as a business location.
- To identify whether, and, if so, what kind of linkages exist between the knowledge-based services sector and Stellenbosch University as a place of knowledge production, research and development (R&D) and innovation.

The formulated problem demands answers to a variety of both descriptive and exploratory research concerns which have been incorporated into the following practical study objectives:

- Reviewing the international and South African literature on knowledge-based service sector activities.
- Identifying a classification system for organizing knowledge-based service industries into meaningful subcategories.

- Constructing an up-to-date database of knowledge-based service establishments currently¹ operating in Stellenbosch.
- Mapping the spatial distribution of the Stellenbosch-based service establishments listed in the database.
- Describing the nature and extent of the knowledge-based service sector in Stellenbosch.
- Determining the reasons motivating knowledge-based service industries to locate in Stellenbosch.
- Identifying the nature and extent of relationships between knowledge-based service establishments and Stellenbosch University.

1.4 METHODOLOGY

The research study, though rooted in a strong theoretical base provided by extensive international literature on service sector dynamics, was unique in its methodological approach due to an overall lack of local research within the specific domain centred on the spatial distribution of knowledge-based service industries within the South African context. No previous studies were identified which provided an appropriate and adequate methodological approach that could be applied to the Stellenbosch case study. Even within the international arena, the majority of research focused on a national scale which was unrealistic for the purpose of this thesis, both in terms of scope and time limitations.

A second obstacle concerned the lack of adequate data sources pertaining to knowledge-based service sector establishments, both nationally, and in Stellenbosch specifically. This deficit necessitated the identification of various secondary data sources, which, combined with newly collected data, was subsequently categorised to construct a usable database that would provide a research population. Due to the extensive nature of the database construction process, and the intellectual and practical value inherent to this extensive new data source, this task, in addition to forming part of the research methodology, was also included as a unique research objective. The main methodological tasks required for both the theoretical and empirical components of this research will be briefly explained below.

¹ The database includes establishments operational in Stellenbosch between January and July 2008.

1.4.1 Literature review

The research methodology firstly entailed a comprehensive literature review of the influence of knowledge-based service industries on the growth dynamics of urban centres and their economic linkages within international and national contexts. The vast extent of available service sector literature, spanning the academic domains of economics and geography, firstly facilitated the definition of important concepts pertaining to the nature and locational dynamics of knowledge-based industries, and secondly allowed the identification of main research trends and results. Chapter Two summarizes the most important concepts and findings, highlighting the importance of research concerning the domain of knowledge-based service industries and recognising the gap in local research within this specific field of study.

1.4.2 Database compilation

A list of relevant businesses was compiled to serve as a population for the distribution of questionnaires. This was done by expanding on a section of an existing 2005/2006 Regional Services Council (RSC) levy payments database obtained from the Cape Winelands District Municipality (CWDM). The final compiled business database consisted of 329 businesses identified as knowledge-based service establishments. Details pertaining to the creation of the database as well as the categorization of business activities are discussed in Chapter Three.

1.4.3 Questionnaire distribution

Data was gathered by distributing copies of a newly developed questionnaire amongst the total population of 329 identified businesses². With N=329, a minimum requirement of 75 completed questionnaires had to be returned to achieve a confidence level of 95% at a confidence interval of 10. This translated into a required questionnaire return rate of approximately 22.8%. A return rate of 31.6% was achieved with 104 businesses having returned completed questionnaires.

² Criteria for business inclusion is discussed in Chapter Three

The questionnaire consisted of 4 main sections. Section A aimed to compile a basic business overview, including business activity classification and the differentiation of establishments into the following categories:

- Branches of international companies situated in Stellenbosch
- Head offices of international companies situated in Stellenbosch
- Branches of national companies situated in Stellenbosch
- Head offices of national companies situated in Stellenbosch
- Companies consisting of a single branch which is situated in Stellenbosch

Section B requested employee details whilst Section C covered issues pertaining to business location and the decision-making process behind the choice of Stellenbosch as location. Finally Section D aimed to determine the degree and nature of industry-university collaboration. The full questionnaire can be seen in Appendix B.

Depending on the available contact details of businesses, questionnaires were distributed by post, email or personal delivery to offices. To achieve the desired information – specifically in determining the reasons for the establishment of the business in Stellenbosch - the form needed to be completed by a member of staff with an in-depth knowledge of the history of the establishment. As such it was requested that the owner, managing director or a member of senior management complete the questionnaire and all communication were directed towards these identified individuals. A pilot study was done amongst five establishments varying in size, branch type and the nature of the business activities. The questionnaire was amended to eradicate ambiguities and subsequently distributed amongst the total population.

1.4.4 Mapping

All maps were composed using ESRI ArcMap 9.2 and visually enhanced in Adobe Photoshop CS3. In order to create a visual representation of business locations within Stellenbosch, geographic coordinates were collected for the majority of identified establishments. A GPS receiver was used to collect the coordinates of 316 of the 329 identified knowledge-based businesses. An additional six pairs of coordinates were obtained from Google Earth and the

coordinates of two remaining businesses were derived in ArcMap based on the existing points of surrounding establishments. The remaining five businesses could not physically be located despite telephonic verification of their addresses. Coordinates were imported into ArcMap to compile three maps³ using true colour composite 2005 SPOT 5 imagery. The first map shows the spatial distribution of 324 of the total identified population of 329 businesses as compiled in the database. The second map indicates the locations of the 104 establishments that participated in the case study by completing questionnaires. The final map shows the distribution of these participants categorized by the type of business activity category they belong to.

1.4.5 Data and spatial analysis

The questionnaire, developed specifically for the Stellenbosch case study, combined closed and open-ended questions in such a way that data analysis and interpretation would be predominantly quantitative. Data obtained from completed questionnaires were imported into the SPSS 15.0 software package for statistical analysis including the use of frequencies, descriptive statistics and cross-tabulation of particular variables. In addition to statistical data from questionnaires, the spatial analysis functionality of ArcMap was utilised to calculate the degree of geographical clustering or dispersion between specific study participants. Details pertaining to the Average Nearest Neighbour tool which was used in this regard is discussed in more detail in section 5.2.5 in Chapter Five.

³ Maps can be seen on pages 59, 60 and 67.

1.5 RESEARCH DESIGN

Figure 1.1 gives a breakdown of the five distinctive phases, each consisting of several components, which together form the research design.

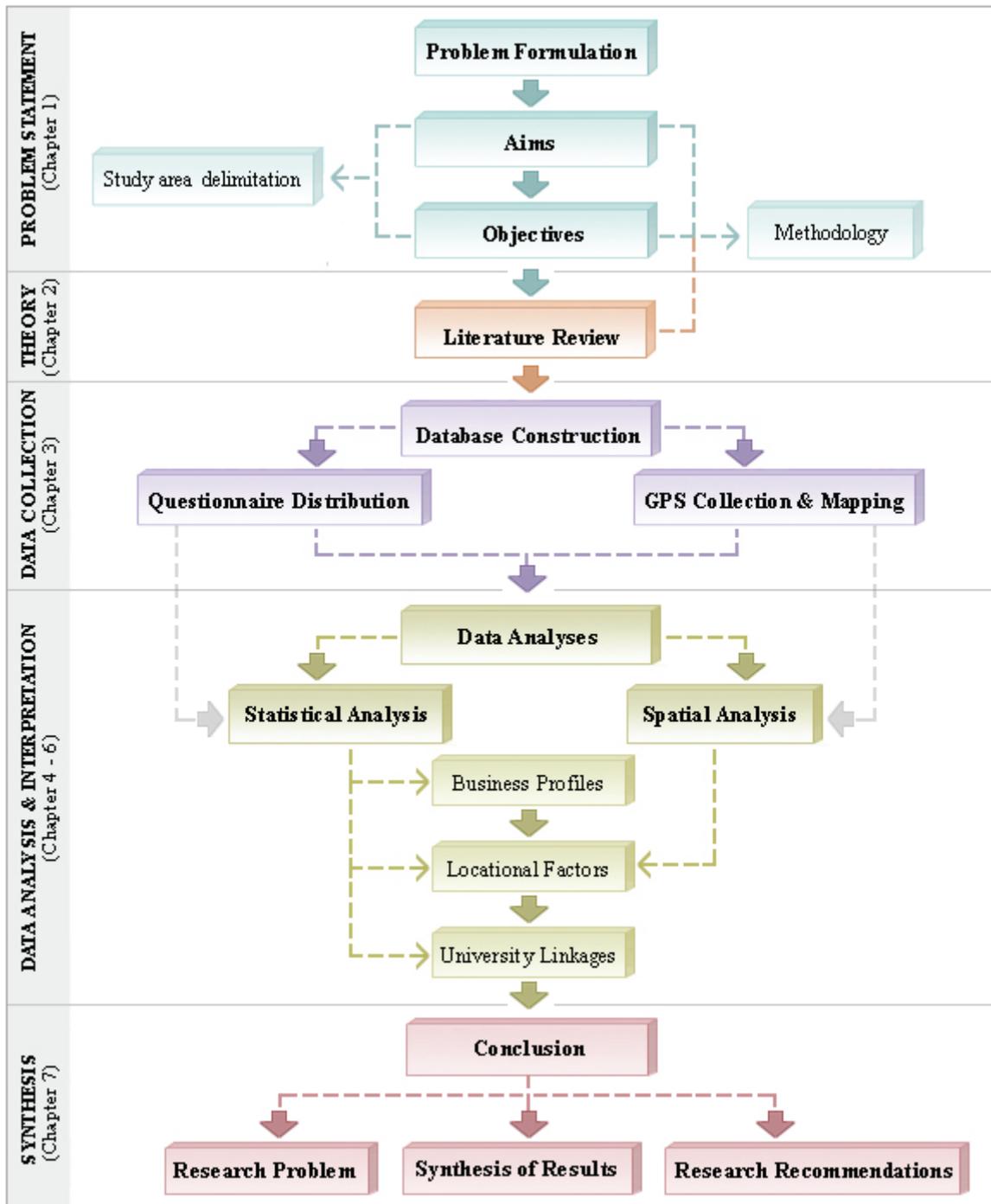


Figure 1.1 Research design

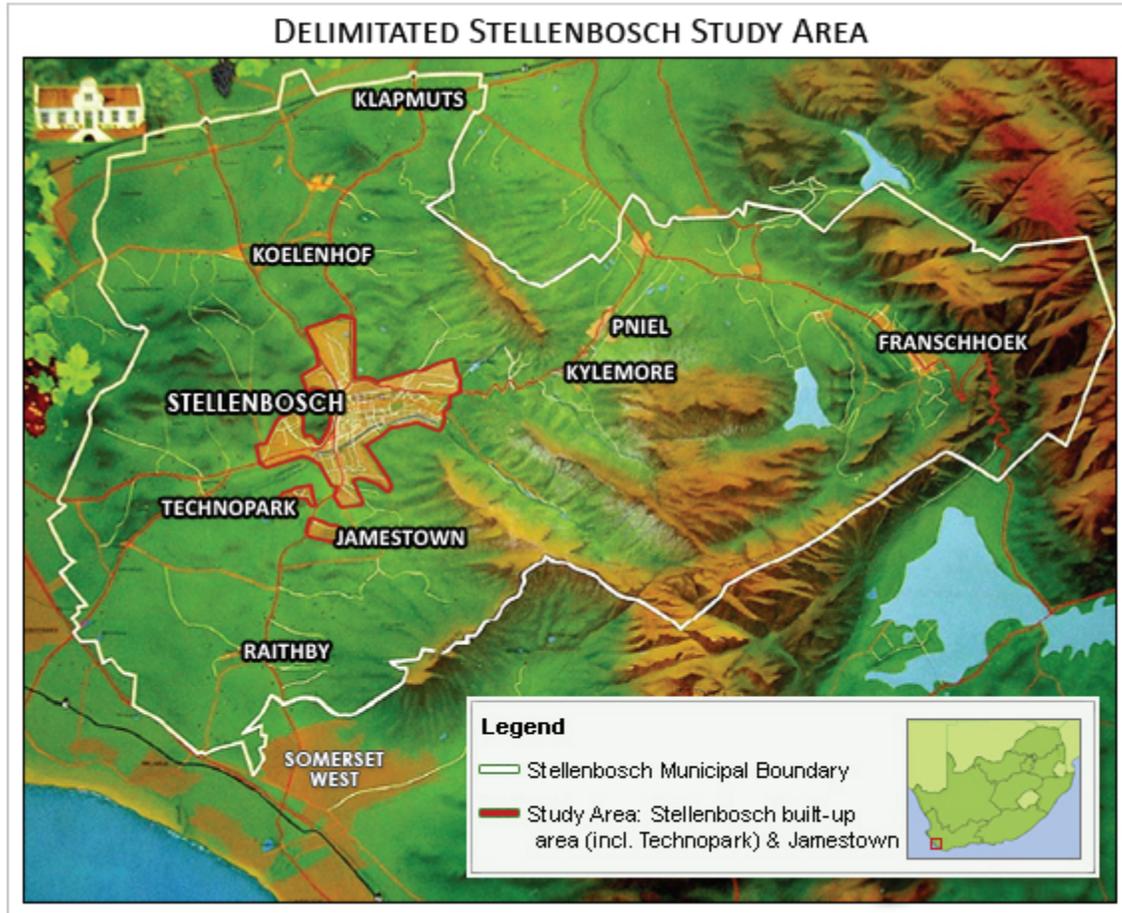
1.6 STUDY AREA

The town of Stellenbosch is situated in the Western Cape Province in South Africa, less than 50km east of Cape Town. Nestled in the heart of the wine industry, the town is surrounded by fertile agricultural land. Established in 1679, Stellenbosch is the oldest town in South Africa and has a rich historic and cultural background which, in addition to its old architecture and scenic natural surroundings, has led to a flourishing tourism industry. The town, with a total population of approximately 120 000 people⁴ (Stellenbosch Municipality 2007), is also internationally recognised for its university which is considered to be one of the top four research universities in the country.

Despite the strong emphasis on the town's thriving tourism and agricultural sectors, the highest contribution (27.1%) to Gross Domestic Product per Region (GDPR) in 2004 was made by the financial and business services sector, followed by manufacturing, wholesale and retail trade, and catering and accommodation services. Furthermore, the 2007 Integrated Development Plan (IDP) recognizes the IT and communication industry as having great potential for economic growth (Stellenbosch Municipality 2007).

From a geographic perspective, the Stellenbosch municipal boundary includes the towns of Stellenbosch and Franschhoek, the hamlets of Klapmuts, Koelenhof, Kylemore, Johannesdal, Pniel, Jamestown, Raithby and the surrounding rural areas (Stellenbosch Municipality 2007). For the purpose of this study with its strong emphasis on matters pertaining to spatial dynamics and locational decision-making, the study area was demarcated to only include establishments located within the town of Stellenbosch as defined by its built-up area. This area also includes Technopark office park which lies just beyond the town boundary. Due to its close proximity to Stellenbosch, the hamlet of Jamestown was also included in the study area. Figure 1.2 outlines the study area in red.

⁴ Census data from 2001 indicate a total population of 117705



Source: Adapted from Stellenbosch Municipality Integrated Development Plan, May 2007

Figure 1.2 Stellenbosch study area and municipal boundary

1.7 THESIS STRUCTURE

Chapter One laid the foundation of the study by presenting the research problem, the subsequently formulated study aims and objectives, and the methodology for achieving these aims and objectives. The following chapter presents an extensive literature review, highlighting pertinent concepts and research trends within the knowledge-based service sector. The literature review not only provides an overview of existing knowledge, but forms a framework for analysis by identifying the most important themes associated with the study field with the purpose of incorporating the most relevant theories on a more practical level in the Stellenbosch case study. Chapter Three lays the groundwork for the empirical constituent of the research by describing the data collection process with specific focus on the selection criteria and compilation of a research population. The key components of the research study are captured in Chapters Four to

Six, which comprise statistical and spatial data analysis and interpretation. Within these discussions the most significant trends are identified among the participating service establishments. Chapter Four provides a general business profile describing the nature and extent of the knowledge-based service sector in Stellenbosch. The following chapter contributes towards a better understanding of location dynamics by discussing the most influential factors motivating businesses to locate in Stellenbosch. Chapter Six investigates the variety of linkages and collaboration that exist between the knowledge-based service industry and Stellenbosch University. Finally, Chapter Seven presents concluding comments and offers suggestions for further research within the knowledge-based service sector.

CHAPTER 2: REVIEWING THE LITERATURE

2.1 THE RISE OF THE NEW ECONOMY

The ever-increasing influence of globalization in what has commonly become known as the post-Fordist era has led to the rise of a knowledge-based New Economy. The rigid systems of Fordist mass production have made way for a growing tendency towards flexible production, which is closely related to the rapid developments in Information and Communication Technologies (ICT) over the past few decades (Aslesen & Isaksen 2004; Bryson, Daniels & Warf 2004; Cornelissen 2006; Harloe & Perry 2004; Jakobsen & Aslesen 2004; Rogerson 2002). The New Economy is characterized by interconnected concepts and phenomena, the main principles of which will be discussed briefly.

2.1.1 Globalization and competitiveness

When defining globalization, Marcuse and Van Kempen (2000) describe an intricate combination of processes that comprise of the spatial integration and concentration of economic activities, increased trade and mobility, the migration of people (and thus labour), changing values and norms, and the facilitation of these changes by advanced new technologies. Pacione (2005: 670) refers to the phenomenon as the “space-time compression of the world and the intensification of consciousness of the world as a whole”. Globalization processes have encouraged the dissolution of trade barriers which have opened up opportunities for foreign investment (Aslesen & Isaksen 2004). Consequently, businesses and industries have become increasingly competitive, complex and heavily dependent on innovation (Bryson, Rusten & Gammelsæter 2003; Daniels and Bryson 2002). Castells (2000) highlights the importance of networks in maintaining competitiveness which relies on the rapid reaction to market demands and developments in ICT. Networks consist of temporary alliances between organizations which are continuously created, destroyed and reformed. Globalization and competitiveness have manifested themselves in urban systems. Sassen (1991) coined the term ‘global city’ to refer to the role of major international cities as key actors in the new world economy. Not only do these cities serve as international trade centres, they also control and regulate the flows of capital,

goods, information and knowledge around the world, simultaneously serving as principle sites of production, and markets of innovation and products (Daniels & Bryson 2003; Sassen 1991; Taylor 2004). Sassen (1991: 3) also notes the importance of world cities as “as key locations for finance and for personalized service firms, which have replaced manufacturing as the leading economic sectors”.

2.1.2 The growth of the service sector

As the fastest growing sector in most developed and many developing countries, the importance of the service industry in shaping the new knowledge-based economy cannot be over-emphasized (Aslesen & Isaksen 2004; Borja & Castells 1997; Bryson, Rusten & Gammelsæter 2003; Castells 1991; Coffey and Polèse 1989; Coffey and Shearmur 1997; Jakobsen & Aslesen 2004; Rogerson 2002). The changes in world output delivered by the agricultural, manufacturing and service sectors in terms of Gross Domestic Product (GDP) over a period of 30 years, is illustrated by Table 2.1 (Pacione 2005).

Table 2.1 Structure of world output, 1960-90 (% of GDP)

YEAR	AGRICULTURE				MANUFACTURING				SERVICES			
	1960	1970	1980	1990	1960	1970	1980	1990	1960	1970	1980	1990
WORLD	10.4	6.9	5.6	4.4	28.4	26.1	22.4	21.4	50.6	56.4	57.0	62.4
INDUSTRIAL COUNTRIES	6.3	3.9	3.4	2.5	31.0	27.7	23.6	21.5	51.6	58.3	60.2	64.7
USA	4.0	2.8	2.6	1.7	29.0	25.2	21.8	18.5	57.2	62.7	63.8	70.3
JAPAN	13.1	6.1	3.7	2.4	35.1	36.0	29.2	28.9	40.9	47.2	54.4	55.8
EUROPE	8.8	4.8	3.6	3.0	34.7	30.5	24.0	21.5	43.8	54.3	59.2	63.8
DEVELOPING COUNTRIES	31.6	22.4	14.7	14.6	15.6	17.8	17.6	20.7	42.8	48.1	44.2	49.8
LATIN AMERICA AND CARIBBEAN	16.5	11.9	9.5	8.5	21.1	22.8	23.5	22.3	50.6	55.3	54.5	57.5
AFRICA	45.8	33.1	25.1	30.2	5.8	8.6	7.7	10.9	37.5	44.0	39.9	41.6
ASIA	38.0	23.9	17.8	17.4	14.4	15.1	15.4	20.9	37.1	42.5	37.9	45.9
SOUTH AND SOUTH-EAST ASIA	44.0	35.6	24.7	18.9	13.7	15.6	19.8	22.9	36.2	41.9	43.5	46.6

Source: International Labour Organization (1995) *World Employment 1995* Geneva:ILO (in Pacione 2005)

Between 1960 and 1990, output in both agriculture and manufacturing has decreased by 6% and 7% respectively, whilst the service sector shows an increase of 11.8%. Industrial and developing

countries show service sector growth of 13.1% and 7% respectively with all major regions showing increases in GDP outputs in the service sector since 1960. A further breakdown of sectors and country comparisons can be seen in Appendix A. The discussion now turns to changes in the economy which stimulate the growth of service activities.

2.1.2.1 Externalization as catalyst for service sector growth

The first explanation for the overall growth of the service sector is the tendency towards externalization (or outsourcing). This development is often the result of increased service specialization and the inclination of firms to focus more narrowly on their core competencies (Bailly 1995; Bryson, Daniels & Warf 2004; Harrington 1995; Klaus 2004). Organizations' decisions to outsource services previously undertaken in-house have caused growth in the number of independent service establishments (Bailly 1995; Bryson, Daniels & Warf 2004; Harrington 1995; Klaus 2004). Externalization of services allows flexibility regarding types and quantity of services and leads to lowered costs, employment risk reduction, the attainment of external expertise, new technology or regulations and change in the complexity of management (Bryson, Daniels & Warf 2004).

2.1.2.2 Flexible production as catalyst for service sector growth

Many authors prefer to emphasize changes in management strategies in addition to explaining service sector growth as primarily the result of the "displacement effect" of externalization (Coffey 1995). Though closely related to the externalization, the second explanation concerns itself with flexible production as the major catalyst for service industry growth. Storper and Scott (in Rogerson 1994b: 1) explain flexible production methods as comprising "ways in which producers shift promptly from one process and/or product to another, or adjust their output upward or downward in the short run without strongly deleterious effects on productivity". The increased demand for greater adaptability to changes in technology and markets has resulted in the increasing vertical disintegration of firms (Bryson, Daniels & Warf 2004; Coffey 1995). Flexible production requires firms to adapt to each individual client's need for specific knowledge-intensive, specialised services as part of projects with time limitations (Aslesen & Isaksen 2004). Consequently, firms build networks that allow the out-contracting of certain tasks to consultants or experts with more appropriate experience. This, in addition to outsourcing their

own ancillary services (often to small-and-medium-sized enterprises (SMEs)), cause the subsequent increase in service industries (Bryson, Daniels & Warf 2004; Coffey 1995; Daniels & Bryson 2002; Harrington 1995; Jakobsen & Aslesen 2004).

2.1.3 The knowledge economy

As a result of post-modern society's increased dependence on new technology, research, product development, marketing and other knowledge-intensive services, the New Economy has analogously been referred to as the knowledge or learning economy (Aslesen & Isaksen 2004; Castells 2000; Harloe & Perry 2004). The need for flexible production processes stems from rising demands for specialized services and rapid adjustments to technological change and dynamic markets that allow firms to gain competitive advantages in a globalized economy (Aslesen & Isaksen 2004; Bryson, Daniels & Warf 2004; Coffey 1995; Daniels & Bryson 2003; Jakobsen & Aslesen 2004). This has resulted in increased investment in the creation, transfer and application of intellectual capital to the detriment of investment in physical goods (Bryson, Rusten & Gammelsæter 2003; Castells 2000; Florida 1999). According to Bryson, Rusten and Gammelsæter (2003: 6) the shift in production processes is not only characterized by infinite expansibility – that is, the capacity to have more than one person use an object simultaneously – but also by the “the increasing weightlessness of physical production”.

2.1.4 Innovation

The vast amount of literature on innovation and learning reflects the importance of these aspects as catalysts for firm development in competitive knowledge-based markets (Boschma 2005; Daniels & Bryson 2003; De Bruijn 2004; Harloe & Perry 2004; Howells 2002; Sternberg 2000). In the context of the New Economy, innovation refers to technological, organizational and market-related advances (Aslesen & Isaksen 2004). Despite the traditional view which interprets innovation as being spaceless and easily accessible worldwide (Florida 1999), many academics explain innovation as a set of complex phenomena intrinsically linked to localised resources that cannot necessarily be reproduced elsewhere (Lawton Smith, Keeble, Lawson, Moore & Wilkinson 2001; Longhi & Keeble 2000; Sternberg 2000). The importance of these spatial

considerations emphasizes the need for contributions by geographers in explaining the relationships between geography and innovation.

2.1.5 A new division of labour

The growth of the knowledge-based, innovation-driven service economy has become synonymous with a new division of labour. Bryson, Daniels and Warf (2004) explains the concept by referring to the increased number of employees who are not directly involved in the production of goods. Even within the manufacturing industry itself, technology has introduced more sophisticated machinery requiring newly skilled maintenance staff involved in services rather than production (Bryson, Daniels & Warf 2004). Increased specialization as a result of flexible production demands new skills, and extended labour processes entail the performance of numerous tasks both before and after the physical production of goods (Walker 1985).

A major factor distinguishing service industries from those manufacturing physical goods is the strong dependence of service expertise on a skilled labour force with sufficient knowledge and experience rather than technical processes and machinery (Bryson, Daniels & Warf 2004; Marshall, Wood, Daniels, McKinnon, Bachtler, Damesick, Thrift, Gillespie, Green & Leyshon 1988). Growth in employment opportunities is often used as a measure of development in the New Economy (Bailly 1995; Coffey & Polèse 1989; Marshall *et al.* 1988). Between 1971 and 1991 employment in high-order services in Canada has shown a 184% increase as opposed to 22% in manufacturing (Coffey & Shearmur 1997). Data from six European countries⁵ showed service employment to have grown 22% between 1980 and 1994, compared with a 21.3% decrease in the primary and manufacturing sectors (Bryson, Daniels & Warf 2004). Producer services in European countries have shown differential growth rates. Whether service activities exhibited fast (UK, France), intermediate (Italy) or slow (Germany, Switzerland) growth depended on factors such as tax rates, governmental manufacturing policies, trade and training (Bailly 1995). International growth is occurring in financial, consulting, ICT, business oriented services, cultural and media industries (Klaus 2004). US projections on employment change between 2000 and 2010 predict increases in knowledge-based service employment with 25.7%

⁵ Countries not specified.

growth in professional employment, 19.1% in service activities, 15.8% in transport and 13.5% in management, whilst blue-collar jobs in agriculture and production show modest growth (Table 2.2).

Table 2.2 Projected employment change in US labour force by occupation (millions)

	2000	2010	% CHANGE
MANAGEMENT	15.5	17.6	13.5
PROFESSIONAL	26.8	33.7	25.7
SERVICES	26.1	31.1	19.1
SALES	15.5	17.4	12.2
OFFICE AND ADMINISTRATIVE SUPPORT	23.9	26.1	9.2
FARMING, FISHING AND FORESTRY	1.4	1.5	0.1
CONSTRUCTION AND EXTRACTIVE	7.5	8.4	12.0
INSTALLATION, MAINTENANCE AND REPAIR	5.8	6.5	12.0
PRODUCTION OCCUPATIONS	13.1	13.9	6.1
TRANSPORTATION AND MATERIAL MOVING	10.1	11.7	15.8

Source: US Bureau of Labor Statistics s.a (in Bryson, Daniels & Warf 2004)

The fastest growing occupations in the US are predicted to fall within high-tech and, specifically, computer-related fields. This reflects the increasing dominance of knowledge-based services as contributors to economic growth (Table 2.3).

Table 2.3 Fastest growing occupations in US labour force (thousands)

	2000	2010	% CHANGE
COMPUTER SOFTWARE ENGINEERS, APPLICATIONS	380	760	100.0
COMPUTER SUPPORT SPECIALISTS	506	996	96.8
COMPUTER SOFTWARE ENGINEERS	317	601	89.6
NETWORK AND COMPUTER SYSTEMS ADMINISTRATORS	229	416	81.6
NETWORK AND DATA COMMUNICATIONS ANALYSTS	119	211	77.3
DESKTOP PUBLISHERS	38	63	65.8
DATABASE ADMINISTRATORS	106	176	66.0
PERSONAL AND HOME CARE AIDES	414	672	62.3
COMPUTER SYSTEMS ANALYSTS	431	689	59.8
MEDICAL ASSISTANTS	329	516	56.8

Source: US Bureau of Labor Statistics s.a (in Bryson, Daniels & Warf 2004)

The continued concern - highlighted throughout the international literature - with the spatial considerations of globalization, competitiveness, knowledge transfers, innovation, service industries and highly mobile skilled labour emphasizes the important role of geographers in understanding the economic processes brought about by the spatially and time compressed New Economy

2.2 AN INTRODUCTION TO THE SERVICE SECTOR

To facilitate a discussion of research pertaining to different subcategories of the service industry, various classifications systems will be clarified. In addition, the relationship between the services and manufacturing industries will be discussed briefly.

2.2.1 The classification of service industries

Broadly defined, service industries conduct activities that are not directly responsible for producing or transforming physical goods, but involve the purchase of intangible commodities primarily produced by people (Daniels 1985; Howells 1988; Marshall *et al.* 1988). This mainly includes finance, insurance and real estate (FIRE) industries, business services, transportation and communication activities, wholesale and retail trade, entertainment, government services and non-profit agencies (Bryson, Daniels & Warf 2004). However, the immense variety of service industries calls for finer systems of classification.

2.2.1.1 Employment-based service classification

In the late sixties, Gottman (1970) approached the classification of service industries from an occupational perspective. Apart from the agriculture and manufacturing industries, he subdivided the classic tertiary service sector into a quaternary sector of high-skill functions (i.e. business management, administration, politics, scientific research, data gathering and higher education), and a reduced tertiary sector consisting of simpler clerical occupations, transport and distribution functions (Gottman 1970; Howells 1988).

2.2.1.2 Output-based service classification

During the 1980s, Howells (1988: 17) differentiated between “those service activities which are physical in nature, involving the handling of ... [tangible] goods..., and information-intensive services which primarily handle information or data”. Whilst the former includes retail, wholesale and distribution activities, the latter involves activities such as research and development, management services and marketing.

2.2.1.3 User-based service classification

A popular classification system distinguishes between consumer and producer services. Consumer services include commodities that meet final demand and are directly aimed at individual consumers, as is the case with retail and leisure services. Producer services meet intermediate demand by providing output exclusively to other firms, manufacturers or government establishments (Coffey & Polèse 1989, Daniels 1993; Howells 1988; Marshall *et al.* 1988). Consumer and producer services are not necessarily mutually exclusive. A third category of mixed circulation services was therefore proposed for commercial and financial activities not aimed exclusively at consumers or other organizations (Daniels 1993).

2.2.1.4 Advanced service classification

Two closely related types of service activities referred to in literature are high-order producer services and knowledge intensive business services (KIBS). Both producer and business services provide intermediate activities which increase value during different stages of the production process of goods or services produced by other firms (Coffey & Shearmur 1997; Shearmur & Doloreux 2007). Whereas reference to high-order services is more prevalent in geographic and regional science studies, KIBS is more closely related to innovation literature (Shearmur & Doloreux 2007). The term ‘high-order’ is used to refer to a subset of producer services responsible for “the processing and synthesis of often complex and non-standard information” (Shearmur & Doloreux 2007: 3). It differentiates more durable producer activities such as management and business consulting, computer-related, and engineering services from less knowledge-intensive, more perishable producer services such as security agencies, office cleaners and delivery services (Daniels 1985). The term ‘knowledge intensive’ is used to denote

complex intellectual and knowledge-based activities for which the dominant production input is human capital (Aslesen & Jakobsen 2007; Shearmur & Doloreux 2007).

For the purpose of reviewing service industry literature, the terms ‘knowledge-based’, ‘knowledge-intensive’ and ‘high order’ services will be used interchangeably to denote the same concept.

2.2.2 The relationship between the service and manufacturing sectors

Many researchers stress that the value of producer services must clearly be separated from the physical goods they aim to distribute (Harrington 1995). Although a vast array of research focuses exclusively on the service sector’s role in economic development, its relation to manufacturing activities is important in understanding the broader economic context. There has been a shift from services as primarily administrative functions to functions with strategic importance in enhancing the production, organization, distribution and consumption of both services and products (Asián 2003). The ability of knowledge-based services to facilitate research, product development, marketing, technological change and more flexible production systems has motivated a growing integration of services and manufacturing. Daniels & Bryson (2002) have estimated service activities to contribute 70–80 per cent of ‘production costs’ in most manufacturing firms. This integration makes it increasingly difficult to separate knowledge-based services related to production from the physical processes of manufacturing products (Asián 2003; Aslesen & Isaksen 2004; Daniels & Bryson 2002). Some academics fear that reinforcing an “artificial division between manufacturing and services” (Daniels & Bryson 2002: 988) may result in inefficient urban economic policies that will neglect the integrated nature of the production system by focusing too closely on specific sectors. Daniels and Bryson (2002: 982) duly note:

“It is surely difficult to identify a manufactured good that is not either the product of service activities or embedded in a set of service relationships? At a very simple level, manufactured goods are the end-result of market research and of design, while sophisticated advertising creates demand for them. On the other hand, many service activities... would be impossible without manufactured commodities”.

2.3 THE LOCATION DYNAMICS OF KNOWLEDGE-BASED SERVICE INDUSTRIES

The locational patterns of service industries have received much attention in academic literature. Though industrial location theories are insufficient in explaining service industry location, they remain useful and deserve a brief overview. This is followed by concepts more closely related to the locational tendencies of knowledge-based service activities. The importance of these industries in regional economic development is discussed with reference to the occurrence of service activities in primary cities, secondary cities, small towns and peripheral locations. The chapter is concluded by discussing the influence of labour requirements and employee demands in determining firm location.

2.3.1 An overview of location theories and concepts

The location dynamics behind the geographic dispersal of service sector activities are generally regulated by different laws than that of the industrial location theories applicable to manufacturing industries, thus rendering the latter insufficient for explaining the distribution of high-order service activities (Begg 1991; Keeble in Rogerson 2002; Rogerson 2001). In knowledge-based service industries, production factors such as transport, product shipment, raw materials and manual labour have become almost obsolete. Service industries' spatial distribution is primarily a consequence of market orientation and a strong dependence on a highly educated workforce (Begg 1991; Bryson, Daniels & Warf 2004; Florida 2005; Marshall *et al.* 1988; Rogerson 2001). Though an in-depth discussion of industrial location theories fall beyond the scope of this review, a brief summary is warranted by the interconnected relationship between manufacturing and service industries. This section will explain the two major schools of thought which dominated industrial location theory, followed by more recent explanatory concepts in the location dynamics of knowledge-based service industries.

2.3.1.1 Industrial location theory: Alfred Weber's theory of cost minimization

Weber suggests the use of a material index to determine a manufacturing location where the lowest costs would occur in terms of either the transportation of raw materials or of finished products (Bale 1981; Estall & Buchanan 1980). Assuming the raw material is not ubiquitous, it would be more beneficial for a bulk-reducing industry to be raw material orientated in terms of location. In a weight-gaining industry the finished product will be heavier and locating closer to

markets makes more economic sense (Bale 1981). Weber's theory also recognizes the potential of agglomeration economies and labour availability to outweigh the advantages of a transport approach as a determinant of manufacturing location (Bale 1981; Pred 1967).

2.3.1.2 Industrial location theory: August Lösch's market area theory

A disadvantage of Weber's model lies in its disregard of the widespread nature of demand (Bale 1981). Lösch's work, on the other hand, focuses specifically on identifying and calculating the extent of the most favourable market areas within a certain region (Lösch 1954). Much like Christaller's central place theory, Lösch formulated a hierarchy model of market places with surrounding spheres of influence predicting that industries will locate where their profits are maximized. His focus on market demand made the theory more applicable to tertiary services (Barnard 2001).

2.3.1.3 Clusters, linkages and the location of service industries

The concept of clusters was introduced by Porter (1998: 78), who defined them as "geographic concentrations of interconnected companies and institutions in a particular field". Clusters encompass suppliers, infrastructure and service providers, manufacturers of complementary products, government, and education and research institutes that provide relevant information and support (Dangelico, Garavelli & Petruzzelli 2007; Porter 1998). Though the clusters concept is not exclusively applied to service industries, the strong relationship between clusters and the rapid dissemination of knowledge warrants the attention it has received in literature on the location dynamics of high-order service industries (Asián 2003; Daniels & Bryson 2003; Keeble & Nachum 2002). The related term 'technology district' is often used to refer to clusters consisting of knowledge-based industries dependent on access to sources of knowledge, technology and highly skilled labour (Albino, Carbonara & Petruzzelli 2007). Clusters promote competition by increasing productivity, speeding up innovation processes for future growth and encouraging the development of new businesses which will eventually strengthen the cluster (Aslesen & Isaksen 2004; Porter 1998). Lawton Smith *et al.* (2001) distinguish between clusters and linkages, with the latter extending beyond spatial proximity to emphasize relational processes such as face-to-face contact and shared cultural backgrounds that facilitate cooperation, collaborative arrangements, knowledge flows and technology transfers between

closely situated firms (Daniels & Bryson 2003). The role of proximity in the location dynamics of industry clusters is discussed in more detail in section 5.2 (page 26).

2.3.1.4 Agglomeration economies and the location of service industries

A major explanation for clusters and centralized geographic patterns – first introduced by economist Alfred Marshall in the 1920s - focuses on the agglomeration economies associated with the spatial concentration of service firms (Castells 1991; Coffey & Shearmur 1997; Florida 2005; Iammarino & McCann 2006; Lawton Smith *et al.* 2001; Rogerson 2002; Sorenson & Baum 2003; Warf 1989). The clustering together of high-order service activities such as information and communication technology industries, research organizations and universities, consultants and government institutions, allows for backward linkages that reduce delivery costs and promotes face-to-face consultation, inter-firm networks and knowledge spillovers (Bryson, Daniels & Warf 2004; Coffey & Shearmur 1997; Florida 2005; Rogerson 2002). In a study by Aslesen and Isaksen (2004), interviews with managers include among the advantages of being situated in an industry cluster, the availability of ‘free’ information, access to trade organizations, the ability to monitor competitors, and information transfers via personal contact between people in the industry. Spatial agglomeration also allows forward linkages by placing service establishments in close proximity to their markets and clients (Aslesen & Isaksen 2004; Coffey & Shearmur 1997; Sassen 2000). Florida (2005) emphasizes the importance of highly skilled, experienced and creative individuals as drivers of innovation and economic growth. He argues that concentrations of these individuals not only motivate firms to locate within an existing cluster but are the greatest driving force behind the formation of clusters, specifically in big cities. Other agglomeration economies include suitable office accommodation, state-of-the-art telecommunication services and reliable transport and infrastructure (Bryson, Daniels & Warf 2004; Warf 1989).

2.3.2 The role of service industries in regional economic development

The location of service activities have become of crucial importance due to evidence showing that high-order services contribute significantly to increasing productivity and driving national and local economic development (Bryson, Daniels & Warf 2004; Coffey 1995; Marshall *et al.* 1988; OECD 2005). Some groups have been optimistic about the potential of the service

economy to direct economic growth in underdeveloped, small or non-metropolitan regions (Coffey and Polèse 1989; Coffey & Shearmur 1997). This optimism comes from an assumption that high-order services - which can significantly contribute to a region's economic base - are no longer subject to locational constraints due to advances in ICT which now allow these industries to choose their prime locations (Bailly 1995; Castells 1991; Coffey & Shearmur 1997; Coffey & Polèse 1989; Rogerson 2001). Despite this perception, international evidence has confirmed "enormous disparities in high order service concentration along the rural-urban continuum" (Coffey 1995: 76). The role that ICT development plays in loosening the locational restrictions of service industries is ambiguous. On the one hand, it is believed that telecommunications can obsolete the necessity for face-to-face contact with clients allowing the decentralization of high order service activities. Conversely, the 'footloose' nature of service industries has been discredited by numerous studies that illustrate the tendency of technology to promote the concentration of service activities in cities due to agglomeration economies (Bryson, Daniels & Warf 2004; Castells 1991; Coffey & Shearmur 1997; Rogerson 2001).

In the US, the suburbanization of service sector activities from large metropolitan centres is an ongoing trend along with the emergence of edge cities and the continuing decentralization of employment (Marcuse 2002). Although large urban centres remain attractive for headquarters, enhanced ICT have encouraged companies' trend to detach back offices with clerical functions from centrally located headquarters by moving them to suburban or peripheral locations with lower office rent and large skilled labour pools (Warf 1989). Increased fears of terrorism have also encouraged decentralization of business activities. As Marcuse (2002: 597) notes: "Over-agglomeration... [is being] equated with danger".

A longitudinal study in Canada by Coffey and Polèse (1989) showed 80% of growth in producer services employment occurred in main metropolitan centres. The outward movement of service activities occurred primarily as a consequence of the natural deconcentration of activities to the metropolitan edge as a result of urban growth, as opposed to planned decentralization from urban core to periphery. The majority⁶ of employment growth outside major urban centres occurred within their immediate spheres of influence within a 100 km radius (Coffey & Polèse 1989).

⁶ 12% of the residual 20% producer services employment growth (Coffey & Polèse 1989)

However, more recent international research has indicated a rise in non-metropolitan service employment (Beyers & Lindahl 1996; Bryson, Daniels & Warf 2004). This can either be ascribed to increasing suburbanization occurring around main urban service centres or to increased growth of rural and small towns located far from established service agglomerations (Bryson, Daniels & Warf 2004).

2.3.2.1 The concentration of service industries in primary cities

There is an established trend for high-order service activities to concentrate within a limited number of large metropolitan areas (Asián 2003; Aslesen & Isaksen 2004; Castells 1991; Coffey & Shearmur 1997; Daniels & Bryson 2003; Jakobsen & Aslesen 2004; Klaus 2004; Warf 1989;). In the US in 1984, two thirds of business and professional service employment were concentrated in large urban centres (Bryson, Daniels & Warf 2004). In Japan in the early '90s, approximately 50% of knowledge-based, research and advertising jobs were situated in Tokyo (Ishimaru in Bryson, Daniels & Warf 2004). Similarly, in 2000, London provided nearly 25% of the UK's business service employment (Bryson, Daniels & Warf 2004; Daniels & Bryson 2003; Keeble & Nachum 2002), whilst in 2001, 40% of Norway's business services jobs were concentrated in Oslo (Aslesen & Isaksen 2004). This trend also emphasizes the rising importance of global cities in the competitive milieu of the new service economy.

The literature refers to supply and demand side explanations for the spatial concentration of knowledge-based business services in primary cities. Cities are ideal locations for maximizing agglomeration economies due to their supply of highly-skilled and experienced labour, research institutions, and universities that educate labour and create the knowledge on which service industries are dependent (Aslesen & Isaksen 2004; Daniels and Bryson 2002). These regional clusters stimulate competition and innovation since spatial proximity facilitates the development of resources (such as skilled labour and new knowledge) which are beneficial to most firms in the cluster (Asián 2003; Aslesen & Isaksen 2004; Daniels and Bryson 2002). Concentration of service firms are also motivated by their demand for being situated close to their main markets and clients who reside in big cities and prefer face-to-face contact (Aslesen & Isaksen 2004). The geographic concentration of head offices in cities thus promotes the concentration of business

services in large urban areas (Aslesen & Isaksen 2004; Coffey & Shearmur 1997; Jakobsen & Aslesen 2004; Rogerson 2002; Sassen 2000).

2.3.2.2 Service industries in secondary cities

The growing importance of second order urban centres in competing with primary urban centres is a trend that deserves mention (Marcuse 2002; Warf 1989). Daniels and Bryson (2003: 2) note that the role of second city regions “as sites for the production, consumption and servicing of flows of global knowledge and capital” has been underestimated due to the emphasis on the global city within literature. Globalization and the development of ICT have rendered physical features such as location and raw materials less important than softer elements such as knowledge and specialized skills, urban lifestyles and cultures (Bryson, Rusten & Gammelsæter 2003; Castells 2000; Florida 1999). Though these attributes are sustaining global city economies, they can also be developed in secondary city regions. A study by Daniels and Bryson (2003) illustrates this situation in Britain, where secondary cities engaged in marketing, environmental upgrading and economic research to promote themselves and attract investors. Sassen (in Daniels & Bryson 2003) found that although the majority of the UK’s producer services were located in London, producer services outside the capital grew at a higher rate, and London’s share in employment had fallen from 40 to 25.1% between 1971 and 1999. Though some have identified knowledge-based services in secondary cities to be mostly back offices with standardized administrative functions situated in lower cost locations (Warf 1989), some branch offices of large firms are strategically located to serve important secondary markets (Aslesen & Isaksen 2004; Daniels & Bryson 2003). A common assumption is that proximity to a global or primary city will cause a shadow effect on the secondary city region rendering them dependent on clients from the main metropole. However, in Birmingham, UK, cases were identified where direct competition occurs between London and Birmingham based professional service firms (Daniels & Bryson 2003).

2.3.2.3 Service industries in small towns and peripheral locations

Though the urban clustering of high-order service industries in city regions remains the dominant trend, Coffey and Shearmur (1997: 417) note that - provided sufficient ICT is available - “individual high order service establishments are able to function quite effectively in small

places, often serving national markets”. Certain studies indeed reflect this decentralization trend and provide several explanations (Beyers & Lindahl 1996; Coffey and Shearmur 1997; Curran & Storey 1993; Daniels & Bryson 2003). Numerous new companies in small towns are either the result of spin-offs from larger firms or the initiatives of individuals who were formerly partners or employees of city-based firms. Furthermore, the rapid development of ICT has facilitated ‘remote’ working, the increase in virtual networked firms, as well as the start-up of companies in owners’ homes (Daniels & Bryson 2003). Many authors ascribe the growth of service industries in small towns to the better quality of life these areas afford professionals (Beyer & Lindahl 1996; Castells 1991; Coffey and Shearmur 1997; Daniels & Bryson 2003; Rogerson 2002). Beyer and Lindahl (1996) coined the terms “lone eagles” and “high fliers” to describe two kinds of rural producer service providers. Lone eagles are one-man business owners, whilst high fliers are firms with one employee or more and usually with a younger average profile. Both types are highly qualified individuals with specialist knowledge desiring a better quality of life in a rural location. Provided rural communities have access to advanced information technology and good transport infrastructure, the export of producer services can play an integral part in the economic development of small towns and rural communities (Beyer & Lindahl 1996; Bryson, Daniels & Warf 2004; Coffey & Shearmur 1997; Stabler & Olfert in Coffey 1995).

Though empirical findings have shown that personalization between firms and clients can occur over large distances, they come at a greater financial cost. Whilst head offices and large firms can incur these costs, smaller firms and SMEs in peripheral areas have fewer available resources (Daniels & Bryson 2003). There is general consensus within the literature with regards to the benefits of geographical proximity. Aslesen and Isaksen (2004) note that firms in peripheral locations face the disadvantage of being much less exposed to new knowledge and ideas than are other KIBS firms in urban centres.

2.3.3 The role of labour in the location of service industries

National growth studies have highlighted a clear correlation between economic development and educated human capital. Many researchers have suggested that the presence of a large pool of skilled labour may act as major catalyst for the location and growth of regional clusters of firms

(Castells 1991; Florida 2005; Iammarino & McCann 2006; Marshall *et al.* 1988; Keeble & Nachum 2002; Rogerson 2001). In a study of locational decision-making which includes interviews with a variety of enterprises from different countries⁷, factors pertaining to the availability of qualified labour ranked among the top ten most important considerations (Klaus 2004). These include the availability and cost of highly qualified labour, work permits for foreign labour, the quality of university graduates and labour management relations. Keeble emphasizes the geographic dispersal of a highly educated workforce as the most significant determinant of the location of high-tech industries in the UK (in Rogerson 2002). Castells (1991) confirms this trend for the USA where labour is reflected as the most important production factor. The strong dependence on high-skilled labour places restrictions on the so-called “footloose” nature of most service industries (Castells 1991).

In relation to the importance of a highly qualified labour force, studies have pointed out the role of environmental pull-factors as considerations in companies’ choice of location (Castells 1991; Klaus 2004; Markusen, Hall & Glasmeier 1986; Rogerson 2002). Klaus (2004: 5) notes that “the central question...is not anymore where...enterprises settle but where...qualified and highly qualified labour settle”. In an empirical study, quality of life as a means to attract high-skilled labour ranked 11th on the list of location factors companies consider most important (Klaus 2004). Markusen *et al.* (1986) and Castells (1991) reiterate this by noting the increasingly important role of a cultural environment with pleasant scenery, a good climate, a variety of educational options and close proximity to amenities and recreational activities in the location of high technology service industries. These factors, believed to increase the quality of life, are often needed to attract suitably educated employees necessary for the growth of knowledge-based industry clusters (Rogerson 2002). Florida (2005) introduced his Creative Capital theory, which acknowledges creative people as the drivers of regional economic growth and emphasizes the tendency of these highly educated individuals to locate in diverse and inclusive environments. This creative class includes scientists, engineers, university professors, artists, entertainers, designers, architects, writers, researchers, analysts, editors, as well as high-tech, financial, legal, healthcare and business management professionals working in knowledge-intensive industries (Florida 2005). The mobility of highly educated individuals with the

⁷ Countries not specified

potential to drive regional economic development by means of innovation, places pressure on regions to produce the environments and infrastructure necessary to attract and keep these individuals.

2.4 KNOWLEDGE, PROXIMITY AND THE UNIVERSITY

The generation of new knowledge is cited as an important catalyst for the survival, success and development of firms, regions and technology districts (Anselin, Varga & Acs 2000; Dangelico *et al.* 2007; Oerlemans & Meeus 2005). The following discussion focuses on the concept of knowledge, the importance of proximity in ensuring the transfer of knowledge, and the role of innovative industry-universities linkages in facilitating knowledge flows.

2.4.1 Knowledge, spillovers and innovation

Bryson, Daniels and Warf (2004: 42) distinguish between information, as simply a form of data that imparts understanding of a subject, and knowledge, which “identifies relationships... [through] the active transformation of information into a form that adds value”. Knowledge spillovers refer to new knowledge acquired during a specific time (i.e. annually) from actors within a cluster of industries by means of intentional or unintentional learning by interaction or imitation (Dangelico *et al.* 2007; Oerlemans & Meeus 2005). The importance of locational factors in knowledge transfers is often dependent on the type of knowledge involved. The literature commonly refers to explicit (or codified) and tacit knowledge. Explicit knowledge consists of clearly formulated cognitive information which is easy to codify and store – often with information technology – and can be easily transferred between individuals or organisations. Tacit knowledge – also referred to as ‘know-how’ – is implicit, specialist knowledge that is necessary to understand and produce explicit knowledge and can give an organization its competitive advantage (Asián 2003; Bryson, Daniels & Warf 2004; Harloe & Perry 2004). Because it cannot be easily codified, tacit knowledge is difficult to access over long distance, which emphasizes the importance of geographic considerations in firm location decisions and knowledge transfers (Bryson, Daniels & Warf 2004; Harloe & Perry 2004). Gaining tacit knowledge is dependent on skilled human capital, ICT and networks of technological and research organizations such as universities (Asián 2003).

2.4.2 Proximity and the transfer of knowledge

Knowledge spillovers and innovation are closely related to proximity considerations. Proximity refers to “a multi-dimensional communication system...[that] can be exploited by firms and regions as a resource for sustaining their competitive advantage, by increasing their innovative capacity” (Albino *et al.* 2007: 5). A distinction must be made between proximity and localization since physical nearness is not always a requirement for proximity (Torre & Rallet 2005). Knoblen and Oerlemans (2006) differentiate between geographical, cognitive, organizational, cultural, institutional, technological, and social dimensions of proximity, with most literature emphasizing the first three.

2.4.2.1 Geographical proximity

Geographical proximity refers to the physical distance separating organizations and takes into consideration the temporal dimension and cost of transport, and differing perceptions of distance. Apart from cost reductions, the proximity provided by geographical boundaries promotes face-to-face interaction which facilitates connectivity and the transfer of tacit knowledge (Albino *et al.* 2007; Aslesen & Isaksen 2004; Dangelico *et al.* 2007; Oerlemans & Meeus 2005, Torre & Rallet 2005). Though increased professional mobility can reduce the importance of geographical proximity (Florida 1999; Torre and Rallet 2005), literature still overwhelmingly reflects the benefits of spatial proximity in improving firm performance (Aslesen & Isaksen 2004; Oerlemans & Meeus 2005; Torre & Rallet 2005).

2.4.2.2 Cognitive proximity

Cognitive proximity refers to a shared knowledge base and common expertise amongst organizations. It promotes knowledge development and transfers by enhancing the absorptive capacity of firms and thus accelerating learning (Albino *et al.* 2007; Boschma 2005; Dangelico *et al.* 2007; Torre and Rallet, 2005). Cognitive proximity decreases as the heterogeneity of knowledge increases. Some authors note that cognitive proximity can also refer to interaction with a group who share common practices or interests despite large geographical distance” (Albino *et al.* 2007; Torre & Rallet 2005).

2.4.2.3 *Organizational proximity*

Organizational proximity is not geographic but relational in nature and refers to interaction between economic actors (Torre & Rallet 2005). It involves the “implicit or explicit routines that allow individuals to be coordinated without having to define relevant behaviour beforehand” (Oerlemans & Meeus 2005: 90). Furthermore, it includes both vertical interaction between members within an organization (the structural level) and horizontal interdependence between actors from different organizations (the dyadic level) (Albino *et al.* 2007; Boschma 2005; Dangelico *et al.* 2007; Oerlemans & Meeus 2005). It allows the collection of non-material assets such as information and tacit knowledge from different actors through inter- or intra-firm collaboration. Examples of organizational relationships include licensing, supply and distribution agreements, joint-ventures and R&D partnerships (Dangelico *et al.* 2007).

2.4.2.4 *The benefits of proximity*

The advantages associated with proximity are also provisional. The benefits of proximity is illustrated by a U-shaped curve indicating that too great a distance between actors inhibits new knowledge creation and prevents knowledge spillovers, whereas excessive proximity can cause an equally negative lock-in situation where the similarity of inter- or intra-firm knowledge bases prevents flexibility and innovation (Albino *et al.* 2007; Dangelico *et al.* 2007; Torre & Rallet 2005). The dimensions of proximity correspond to types of clusters. Geographical, organizational and cognitive proximity is represented by industrial districts, multinational companies and virtual communities respectively (Albino *et al.* 2007; Torre & Rallet 2005).

2.4.3 The role of the university in knowledge transfers and innovation

With a renewed emphasis on regional development combined with the importance of knowledge in the New Economy, the role of universities is being re-evaluated. Competitiveness and innovation have become widely recognized drivers of economic development and universities as knowledge producers are receiving more attention in both regional and national development strategies (Florida 1999; Harloe & Perry 2004; Lawton Smith & De Bernardy 2000; Litan, Mitchell & Reedy 2007). Universities are experiencing mounting pressure to partake in “knowledge capitalism” (Burton-Jones 1999) by eliciting the competitive and economic

advantages of knowledge creation (Anselin *et al.* 2000; Harloe & Perry 2004). There is a growing tendency for industries to outsource innovation activities to universities which themselves then become service industries (Lawton Smith *et al.* 2001). Researchers mostly measure university-driven innovation by patents, licensing activities, spinoff and start-up companies, consulting between Faculties and industry, and other non-patent innovations (Litan *et al.* 2007).

2.4.3.1 The shift from basic to applied research

Harloe and Perry (2004) note the “different conception of the function of the university in relationship to the state and the market, which can be explained primarily in the context of the development of the knowledge economy” (213). The traditional functions of the university revolved around education provision and the scientific pursuit of knowledge (Anselin *et al.* 2000; Harloe & Perry 2004; Lawton Smith & De Bernardy 2000; Lawton Smith *et al.* 2001). Strengthened relationships between universities and government since the post-war years have gradually brought about greater emphasis on the relevance of knowledge and the application of science to solve national problems. The contemporary view of science recognizes the strategic link between science and innovation, with the emphasis on the potential of knowledge to accelerate development through university-industry relationships (Florida 1999; Harloe & Perry 2004; Litan *et al.* 2007). Empirical research in the US, where the percentage of R&D funded by industries rose from 2.6% in 1970 to 7.1% in 1997, confirms this tendency. Patenting amongst the top 100 universities also rose from 177 patents in 1974 to 1486 in 1994 with over 6000 patent applications [being] received from 158 universities in 1997 (Florida 1999). Lawton Smith *et al.* (2001) interpret this shift as the commercialization of the university’s traditional teaching and research functions in an attempt to obtain private sector funding. Harloe and Perry (2004) refer to universities that practise multi-disciplinary and application-oriented research as ‘Mode 2’ universities. These institutions are characterised by closer links to local government and increased alignment with market and industry demands (Florida 1999; Harloe & Perry 2004; Lawton Smith & De Bernardy 2000). Economic and socially relevant applied research necessitates these relationships that reflect the pervasiveness of Castell’s ‘networked society’ on which the globalized knowledge-based world has grown increasingly dependent (Albino *et al.* 2007; Castells 2000).

2.4.3.2 Universities as actors driving local economic development

The devolution of political power to sub-national government has placed renewed emphasis on the economic significance of cities and regions in competitive attempts for investment (Harloe & Perry 2004; Lawton Smith & De Bernardy 2000). As a consequence, universities are seen as strategic partners in regional development strategies and they are experiencing growing pressure to contribute to innovation and competitiveness by mobilizing the economic advantages of science and knowledge (Harloe & Perry 2004; Lawton Smith *et al.* 2001). Lawton Smith *et al.* (2001) further notes that “[i]nnovators are geographically concentrated when there are conditions of high opportunity... a relevant source of scientific knowledge available in a specific location, or a knowledge base characterised by tacitness, complexity and systemic features” (89). This implies that universities are not only innovators in their own rights, but attract competitive knowledge-based industries. The literature, however, reveals accounts of friction between profit-driven industries and universities regarding the confidentiality of research results which opposes many universities’ stance of open research publication and knowledge production (Florida 1999). Florida (1999) suggests that economic actors should shift their focus from university-industry relationships to the task of higher education institutes to attract intellectually talented students – essentially the future drivers of the knowledge economy.

2.4.3.3 Universities as producers of skilled labour

Within the new knowledge economy the importance of natural resources and manual labour has taken a backseat in preference of intellectual capital and the highly-skilled workforce necessary to ensure competitiveness (Anselin *et al.* 2000; Asián 2003; Florida 1999; Harloe & Perry 2004; Lawton Smith & De Bernardy 2000). According to Lawton Smith & De Bernardy (2000) the number of staff members with local university degrees and the extent of firms’ local recruitment attempts reflect the availability of local suitably skilled employees. However, literature also suggests that the mobility of skilled people emphasizes the importance of environmental factors in their decision to work at a specific location (Florida 1999). University towns often fulfil the intellectual employee’s desire to be surrounded by other intellectual individuals. The stimulating university environment attracts large pools of talented scientists and students who generate innovative ideas, projects and companies which in turn motivate other firms to locate nearby (Daniels & Bryson 2002; Florida 1999; Lawton Smith & De Bernardy 2000). Though

universities supply highly skilled individuals who drive innovation, local industries and government actors need to create the environment and infrastructure necessary to prevent talented individuals from locating elsewhere (Florida 1999).

2.4.3.4 Universities and industry clusters

The geographic concentration of industries around higher education and research institutions take on different forms. Firms tend to cluster for purposes of increased innovation. Spatial concentration is necessary to take advantage of a so-called ‘innovative milieu’, where university-industry relationships are facilitated by geographic and cultural proximity (Iammarino & McCann 2006; Lawton Smith & De Bernardy 2000; Oerlemans & Meeus 2005; Porter 1998; Rogerson 2001; Torre & Rallet 2005). Research by Castells and Hall (in Borja & Castells 1997) investigates the global phenomenon of clustered technology-driven activities in innovative milieu referred to as ‘technopoles’, which have a strong association with research institutions. These organizations - often higher education institutes - simultaneously provide new technological knowledge as raw material and a steady supply of highly educated and specialized graduate recruits as labour force (Borja & Castells 1997; Rogerson 2002). Clustering also develops around universities when academic entrepreneurship manifests itself in knowledge-based “spin-off” firms that originate as a result of academic research initiatives. In Grenoble, over 75 university or research spin-offs have originated since 1982, whilst approximately 50 firms whose origins can be traced to the university still survive in Oxford. Silicon Valley (close to Stanford University) and Cambridge also illustrate this trend (Lawton Smith & De Bernardy 2000; Lawton Smith *et al.* 2001). Relationships between knowledge institutions and industry are often facilitated by science parks which aim to commercialise science and research initiatives. Rogerson (2002: 9) also notes the “emphasis...placed on the facilitation of science or technology parks, a common policy intervention undertaken by local governments...to foster high-technology industries.” Successful European university-related science parks exist in Oxford, Cambridge, Grenoble, Sophia-Antipolis, Helsinki and Munich. The two principal benefits of science parks, as noted by participatory firms, are access to new technology and the use of students as part-time employees (Lawton Smith & De Bernardy 2000).

Though some still question the importance of universities in determining the location of R&D firms (Aslesen & Isaksen 2004), many studies confirm a distance-decay effect in university-industry collaboration. Athreye & Keeble (2002) confirm that private sector product innovation in SMEs in British counties corresponds positively with local expenditure on university and government R&D. Similarly, Anselin *et al.* (2000) identified geographical ranges within which spillovers from university research affected industry innovation. The extent of collaboration between the industries situated near Oxford and Cambridge respectively, have been extensively documented (Lawton Smith *et al.* 2001). Whilst Oxford has more pronounced ties with larger manufacturing industries, Cambridge supports a greater concentration of smaller high-technology producer service industries. The combined Oxford and Cambridge sample included a majority of high technology service firms of which half or more of those included in the study were involved in linkages with their local universities (Lawton Smith *et al.* 2001).

2.5 THE KNOWLEDGE-BASED SERVICE ECONOMY IN THE SOUTH AFRICAN CONTEXT

Although service industry literature focuses more distinctly on developed countries, many of the concepts and trends discussed in previous chapters also apply to developing countries and South Africa particularly.

2.5.1 The impact of globalization on South Africa

As South Africa moved into a new democratic era in the early '90s, the country faced its readmittance into a new competitive global economy after two decades of exclusion through sanctions and trade barriers (Harrison 1994; Rogerson 2000). The introduction of the macroeconomic Growth, Employment and Redistribution Strategy (GEAR) aimed to assist the re-integration of the country into the international economic arena, to promote initiatives to attract foreign investment, and to restructure the State through the devolution of power from national to local level (Mouton 2003; Rogerson 2000). The shift from top-down national planning to more decentralized local economic development (LED) strategies placed renewed emphasis on the importance of locality and the role of cities as gateways to global exchanges (Cornelissen 2006; Nel 1999; Rogerson 2000; 2004; WCPG 2001). The concept of local

economic development (LED) is interpreted as an umbrella term for outcomes-based local initiatives organised by partnerships of local stakeholders with the aim of promoting economic growth (Rogerson 2000). Internationally and locally, LED involves market-led approaches of business development as well as market-critical approaches of community development. With local government having more autonomous control over planning, market-led forms of LED is on the increase and manifests itself in urban competitive strategies that attempt to establish specific localities as viable competitive players in the world economy (Harrison 1994).

2.5.1.1 Local economic development and place entrepreneurialism

The shift of local economic development (LED) responsibilities from national to provincial and local government actors has resulted in growing competition between provinces in attempts to attract footloose investment (Harrison 1994; Rogerson 2000). What Harvey (1989) referred to as the shift from managerialism to entrepreneurialism in local government planning, is illustrated by four market-driven LED strategies focused on place marketing (Rogerson 2000). The first competitive strategy involves the promotion of cities and towns as centres of production through local boosterism. The marketing of urban spaces to external investors demands that emphasis be placed on the comparative advantages of locations and infrastructure. Whilst Port Elizabeth focuses on industrial investors, Cape Town and Pretoria advertise themselves as ideal locations for high-tech industries. Technology and science parks have served as means to target investment in both Stellenbosch and Pretoria, whilst Johannesburg's marketing strategies are specifically aimed at American investors (Rogerson 2000). A second market-driven approach to LED demands the promotion of cities and towns as centres of consumption, entertainment and recreation. Initiatives of place marketing through tourism initiatives and cultural activities such as waterfront developments, shopping malls and sports and convention centres (seen in Durban, Johannesburg and Cape Town), have promoted the growth of service sector activities (Harrison 1994; Rogerson 2000). A third LED approach involves the competition between cities to attract government investment by means of becoming the location of government offices, institutions, contracts or attracting development projects. The final LED strategy, as a more direct manifestation of the global competition discourse, comprises activities such as place (re)imaging, ICT and finance infrastructure development in attempts to compete with other international cities for high-level decision-making and control functions. Cape Town and Johannesburg actively

engage in competition with other African countries to attract international business headquarters (Rogerson 2000). In Johannesburg, plans to develop the metropolitan economy were introduced with the specific aim to develop its status to that of a world city (GPG *s.a.*; Rogerson 1994a). Whilst primary cities have greater access to funds and the advantage of specialised economic development units to identify and implement LED initiatives (Rogerson 2000), increasing concern is being raised about the inability of peripheral localities to engage in place entrepreneurialism (Harrison 1994).

2.5.1.2 The growth of regional disparities

The growth of the New Economy and an emphasis on regional and urban competition has been cited as causes of the widening gap between regional economies. Harrison (1994) highlights the inability of already lagging regions to engage in entrepreneurial strategies, resulting in increased regional disparities and the further marginalization of peripheral localities. A White Paper on *Preparing the Western Cape for the Knowledge Economy of the 21st Century* (WCPG 2001: ix) notes that “[c]ountries and regions that are ill-prepared for the knowledge economy will fall behind and find it increasingly difficult to catch up”. In a study examining the growth potential of towns in the Western Cape, economic transformation is cited as one of six possible factors causing the retarded growth of towns. Despite their contribution to economic development, the growth of high order service activities to the detriment of the traditional primary economic activities have led to the demise of certain small towns (Van der Merwe *et al.* 2005). Since the shift to a knowledge-based service economy is synonymous with globalization, a reversal of sector growth trends is unlikely in the near future. It is thus possible to argue that the incorporation of knowledge-based service industries into the economies of peripheral localities could be of crucial importance in ensuring their sustainability.

2.5.2 The importance of knowledge in the economic development of South Africa

In recent decades South Africa has developed strong technological expertise to allow new linkages with the global world economy. Castells (1998) and Rogerson (2000) express optimism regarding the potential of these linkages to facilitate the incorporation of the African continent into the IT revolution of the New Economy. A Trade, Industry and Investment Review by the Southern African Development Community (SADC 2006), confirms the South African economy

with its efficient financial system to be the most advanced on the African continent. One of the South African government's main priorities - outlined in the National Spatial Development Perspective (NSDP) - necessitates an increase in economic growth (The Presidency 2006a). In addition, the Accelerated and Shared Growth Initiative of South Africa (ASGISA), as two of its main initiatives, aims to, firstly, promote private-sector investment by targeting economic sectors with good growth potential, and, secondly, plans to create a macroeconomic environment more conducive to economic growth (The Presidency 2006b).

The importance of knowledge-based service activities as catalysts for regional and national development is well-documented in the literature, but also emphasized by South Africa's provincial and local frameworks and strategies (Cornelissen 2006). The White Paper on *Preparing the Western Cape for the Knowledge Economy of the 21st Century* is one such initiative which recognizes "the increase in competition brought about by globalization [and]...the rise of knowledge as the key factor of production" (WCPG 2001: 1). Driven by the vision of transforming the Western Cape into the most competitive and innovative region in Southern Africa, it aims to create a 'Learning Cape' by enhancing skills and education. In addition, by making the province attractive for investment through place marketing, it hopes to develop an 'International Cape'. A further objective is to create an 'Enterprising Cape' to serve as a centre for R&D and innovation. More recently, the Western Cape's Provincial Growth and Development Strategy (PGDS) (also referred to as iKapa Elihlumayo) again acknowledged the rise of the new knowledge economy in which information, ICT, human capital and R&D investment play a pivotal role in the economic success of regions (WCPG 2006). In a basic and practical sense, these trends are illustrated by the rising contributions of knowledge-based industries to Gross Domestic Product (GDP).

2.5.3 The growth in knowledge-based industries

Reflecting the international trend, the knowledge-based services sector has become one of the principal contributors to economic growth in South Africa. Table 2.4 illustrates the dominance of service sector activities with the leading contribution to GDP in 2004 coming from community,

social and personal services (R194,175m), and FIRE and business services (R194,093m) respectively.

Table 2.4 Gross Domestic Product (GDP) by sector (R m; constant 2000 prices)

ECONOMIC SECTOR	2000	2001	2002	2003	2004
AGRICULTURE, FORESTRY, FISHING	27,451	26,558	28,292	26,604	26,926
MINING, QUARRYING	63,391	63,325	63,927	66,661	69,436
MANUFACTURING	159,106	164,131	168,729	167,261	171,563
ELECTRICITY, GAS, WATER	22,788	21,956	22,010	22,091	22,521
CONSTRUCTION	21,114	22,154	23,441	24,655	26,218
TRADE, CATERING, ACCOMMODATION	122,702	125,017	127,870	136,479	145,392
TRANSPORT, STORAGE, COMMUNICATIONS	80,873	85,646	93,390	98,288	103,695
FINANCE, REAL ESTATE, BUSINESS SERVICES	156,253	169,015	179,569	186,970	194,093
COMMUNITY, SOCIAL, PERSONAL SERVICES	184,540	184,451	186,422	190,334	194,175
GDP AT FACTOR COST	838,218	862,253	893,650	919,343	954,019

Source: South African Reserve Bank Quarterly Bulletin, September 2005

It is important to note FIRE and business services' replacement of the manufacturing sector as second largest contributor to GDP in 2001. Another interesting trend is the narrowing gap between the community, social and personal services sector, and the FIRE and business services sector with the difference in contributions falling from R28,287m in 2000 to R82m in 2004, indicating that the FIRE and business services sector is on its way to becoming the leading contributor to GDP in South Africa.⁸

The national trend is also illustrated on a provincial level. According to the 2006 PGDS, the Western Cape's services sector contributed 65% to the province's economy. In addition, service-related industries were responsible for the creation of the majority of new jobs (WCPG 2006). According to 2004 statistics, the FIRE and business services sector was the largest contributor to Gross Domestic Product per Region in the Western Cape, Gauteng, Eastern Cape and the Free State. A detailed breakdown of GDP contributions per sector in these provinces can be seen in Appendix A.

⁸ It could not be determined whether this is indeed the current case due to more recent statistical data not being obtainable.

Gauteng remains a leading contributor to service sector growth. The Provincial Economic Review and Outlook (PER&O) shows the FIRE and business services sector to be the greatest contributor to regional GDP in 2005, with a 24% share in Gauteng and a 20% share in the rest of South Africa (Figure 2.1) (GPG 2007).

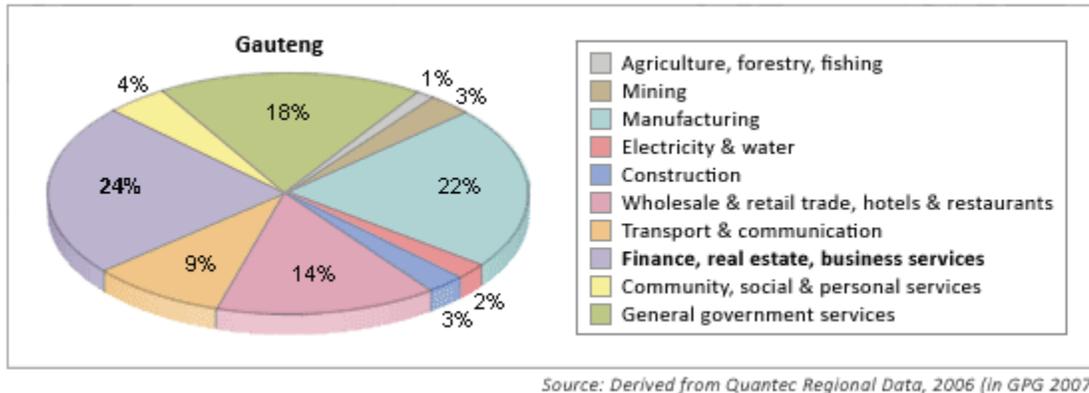


Figure 2.1 Sector shares in the regional GDP of Gauteng, 2005

It is interesting to note the relatively large 22% share in manufacturing and it is perhaps necessary to keep in mind the close links between business services (as service providers to other industries) and manufacturing industries. Although the service sector and knowledge-based service activities specifically, contribute significantly to the economic growth of South Africa, these industries are not evenly dispersed. The discussion now turns to the location of knowledge-based services industries in South Africa.

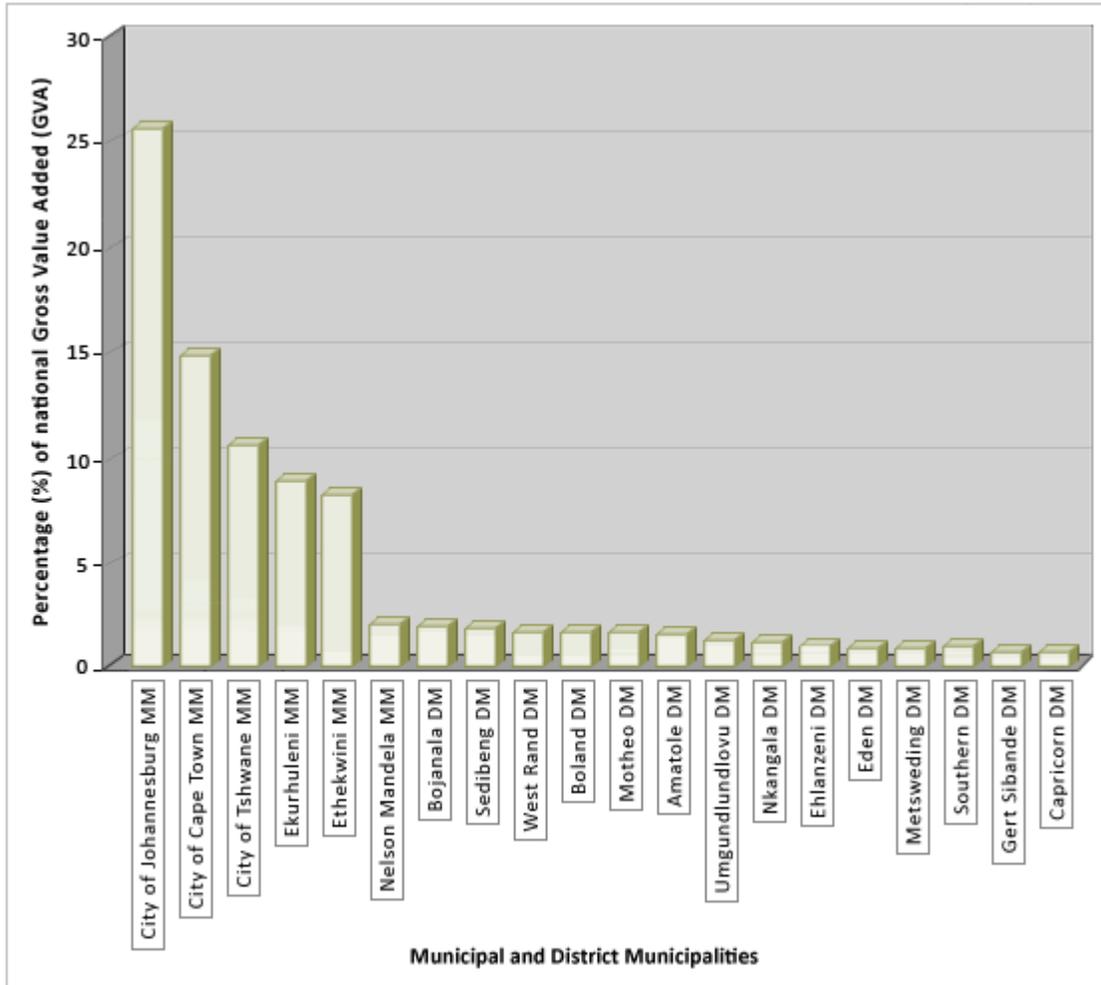
2.5.4 The nature and location of knowledge-based service industries in South Africa

Despite the vast collection of international literature and a local awareness of the significant economic impact of knowledge-based industries, a relative lack of academic research on the nature and location of knowledge-based service industries in the South African context still exists. As one of few South African researchers who have explored the topic, Rogerson (2001: 34) confirms that “it is necessary to understand the dynamics of knowledge-based activities as potential drivers of the national space economy”. Though much of the international literature and South African statistics highlight the importance of ‘information intensive’ producer services such as FIRE, business and legal services, information provision and computer system

management (Borja & Castells 1997; Sassen 2000), Rogerson (2001) argues that most South African knowledge-based firms fall within either high-technology manufacturing or information technology (IT) service industries. Since the growing trend of integration between services and manufacturing has already been established in section 3.2, it is assumed that Rogerson's emphasis on the locational decision-making of high-tech manufacturers also hold relevance for the broader knowledge-based service sector. He reiterates the general opinion that the growth in knowledge-based activities warrants 'a new logic of economic location' (Rogerson 2001:36) that transcends traditional theories of industrial location (Bryson, Daniels & Warf 2004; Florida 2005; Marshall *et al.* 1988; Rogerson 2002).

Similar to international trends, the spatial pattern of knowledge-based industries in South Africa resembles the geographic clustering of firms (Rogerson 2001). Rogerson (2001) defines the geographical agglomeration of related knowledge-based activities and industries as 'smart regions', with the potential to be influential growth nodes and drivers of economic and spatial development. Gauteng has the largest knowledge-based producer services cluster in the country with strongest growth being displayed by business and financial service sectors (Figure 2.2.). It is predicted that by 2009 these will have become the strongest sectors of Johannesburg and Tshwane's metropolitan economies (GPG *s.a.*).

Statistics furthermore indicate that, 78% of jobs provided by the IT service industry, was found in Gauteng (Rogerson 2002). Contributions by the top twenty municipalities to the economy in terms of Gross Value Added (GVA) of service and retail activities, clearly illustrate the dominance of Gauteng as primary location for knowledge-based service industries (GPG *s.a.*). All of the province's metropolitan (MM) and district municipalities (DM) feature in the list of top twenty contributors (Figure 2.2.). The graph also emphasizes the concentration of service industries in large metropolitan areas with Cape Town, Tshwane, Ekurhuleni and Ethekwini showing significant dominance over other municipalities, and Johannesburg remaining the clear leader with more than a 10% lead. This supports Polèse's (1990) argument that the tendency of service establishments to concentrate in major urban centres is an international phenomena also observed in developing nations.



Source: CSIR Gauteng Spatial Development Perspective presentation, November 2005

Figure 2.2 Top twenty contributors to the national GVA of services- and retail activities

It is estimated that 64,109 employment opportunities have been provided by 1,220 information technology service organizations (Rogerson 2002). The concentration of an educated workforce influences the location decisions of high-tech industries. The locational preferences of qualified employees play a significant part in the geographic distribution of important sectors of the information service economy as is reflected in the three leading knowledge-based service areas in South Africa. In Johannesburg, Randburg and Cape Town “employment numbers in the IT service economy currently exceed those of the (much larger nationally) high technology production economy” (Rogerson 2002: 17).

2.5.5 Innovation and the role of universities in South Africa

In a world where knowledge, innovation and human capital drive economic growth, the importance of universities and higher education institutions cannot be overstated. The academic community's lack of international scientific collaboration during apartheid has hampered the country's scientific development (Mouton 2003). Attainment of the government's post-apartheid goals of job creation, skills development and increased competitiveness in the new knowledge-based economy, is thus greatly dependent on investment in research and development, and accessible, improved education and training opportunities (CWDM 2006a; Rogerson 2000; The Presidency 2006b; WCPG 2001; 2006). Universities contribute to narrowing the divide between the highly skilled 'haves' and the unskilled 'have-nots' through the two traditional functions of advanced education and research. The White Paper on *Science and Technology* (S&T) (1996: 4) refers to the government's vision as

“...one where...South Africa uses S&T to become economically competitive on a global scale and... to provide essential services, infrastructure and health care for all South Africans. [In this] National System of Innovation... universities [and] technikons...would co-operate in a nationally optimal way towards solving real problems, whether these occurred in industry, agriculture, defence or basic research”.

2.5.5.1 The commercialization of universities

The restructuring and corporatisation of universities since 1994, in response to the competitive nature of the global economy, is a significant point that requires mention (Mouton 2003). Similar to the international experience, South African higher education institutions have been subjected to mounting pressure to become more responsive to market needs in order to be competitive and obtain funding from external sources (Bostock 1999; Mama 2004; Mather 2007; Mouton 2003). The White Paper on *Preparing the Western Cape for the Knowledge Economy of the 21st Century* (WCPG 2001: ix) recognises the dependence of economic success on “an environment that ... have encouraged the development of world-class universities with close ties to the business community,...inter-firm collaboration, networking and knowledge sharing”. It is the encouragement of industry-linked teaching and research that has raised concerns from some constituents who claim that the social relevance and educational objectives of higher education are taking a backseat (Vale in Mather 2007). Despite opposition against commercialization,

increased competition between universities for scarce resources have lead to many departments becoming increasingly dependent on external funding (Mouton 2003). With total expenditure on R&D in South Africa in 2000 amounting to 0.7% of GDP, compared to a 1.7% average in OECD countries, universities cannot truly afford to decline any opportunities for funding if they want to remain competitive.

2.5.5.2 The promotion of applied and strategic science

Mouton (2003: 6) notes that strategies by the country's national system of innovation (NSI) give science "no alternative but to serve the newly formulated and legitimized national goals and interests". This is exemplified by the noticeable shift of R&D funding towards the promotion of applications-based and strategic research indicating the influence of international trends (Mouton 2003). The government calls scientists to apply their resources to strategic science which is aimed at achieving national social and economic goals (South Africa 1996). A study by the National Research and Technology Audit (NRTA) (in Mouton 2003) showed approximately 20.5%⁹ of academics classified their work as purely applied science compared to 16% and 6% who stated their work to be principally fundamental or basic science. In addition, 28.5% of correspondents chose classifications consisting of a combination of research types, of which one is applied research. A further 10% indicate their science to be directly related to R&D. The study also showed 30.5% correspondents occupied themselves with some form of strategic science.

Literature and government policies confirm that new knowledge creation and R&D are prerequisites for the level of knowledge-based economic growth necessary to allow South Africa to compete successfully in the global service economy. Rogerson (1994b: 10) lists "high quality labour [and] good educational and research institutions" as primary advantages in leading the Cape Town region to becoming a prime location for technology-intensive industries. As centres of research and education, universities do not only have a crucial role to play in the creation of new knowledge, but are also responsible for providing the highly skilled human capital necessary to drive innovation in the knowledge-based industries that are fast becoming leading catalysts in both provincial and national economic growth.

⁹ Percentages derived by author from statistics in Mouton 2003.

2.6 CONCLUSION

A vast amount of international literature by geographers, economists and sociologists is dedicated to the nature and consequences of globalization. Developments in ICT, global trade and flows of investment and information have given rise to what has been termed the new knowledge economy characterised by increased competition and a dependence on innovation. Synonymous with these developments have been the rise of a knowledge-based service industry, to the detriment of the formerly dominant manufacturing sector.

As highlighted by this review, the international body of literature that concerns itself with the significant influence of the service sector on economic growth reveals many research trends. Firstly, reasons proposed for the increase in service activities vary from the move towards increased externalization of specialized services to the influence of flexible production systems that promote vertical disintegration.

Secondly, several aspects regarding the location of these service activities have been explored. The importance of agglomeration economies along with the central role of labour requirements were emphasized as reasons for the concentration of service activities in metropolitan regions. These explanations question the perception of service industries as free from locational constraints.

This lead to a third research thread which relates to the potential of service industries to become drivers of economic growth in secondary cities and small towns or peripheral areas in order to even out regional disparities. Although optimism is flailing, several aspects regarding the influence of developing communication technologies on the location decisions of service industries remain unresolved. Furthermore, the demands of highly educated individuals in search of a better 'quality of life' are becoming an increasingly important locational factor for service industries which rely heavily on high-skilled labour.

A fourth consideration is the potential of universities as knowledge creators, contributors to innovation and suppliers of highly skilled labour, to attract and stimulate knowledge-based service activities within close geographical proximity. Within higher education itself, the

commercialization of universities has received much attention. The rise in university-industry partnerships and the resultant shift from basic to application-driven research can be directly related to competitive pressures faced by local and regional economies to survive in a global world driven by knowledge and innovation.

Several of the mentioned trends also resonate through South African literature. Defined by the demise of apartheid and the reintroduction to the world stage, the '90s brought new attention to the effects of globalization and increased international competition in a post-apartheid South Africa. Despite still being in its infancy in comparison with developed countries, the growth of the knowledge-based service sector has already been recognised as exerting much influence on both national and regional economic growth. Although the crucial role to be played by knowledge, science and technology in South Africa's economic development has been recognised in government documentation such as the White Papers on *S&T* and *Preparing the Western Cape for the Knowledge Economy of the 21st Century*, a general lack of academic research still exists on the nature and extent of local knowledge-based service industries. With a stronger emphasis on manufacturing industries and broader matters of flexible production and LED initiatives, relatively little research has been done on the location dynamics of specific knowledge-based service industries. Keeping abreast with international trends, the importance of higher education institutes has also been recognised and the government's encouragement of strategic and applied research has been documented.

In conclusion, this extensive review of the literature has not only identified specific research trends and defined important concepts related to the knowledge-based service industry, but has shown that the potential of this industry to drive economic growth is relevant in both international and local contexts. However, South Africa, as developing country, faces many challenges in securing its place in the competitive global economy and as such demands more in-depth research of issues pertaining to the knowledge-based service sector. Keeping in mind the shift in focus towards regional growth strategies, the spatial dimension of the growing service industry cannot be ignored. It is therefore the main aim of this research to investigate, by means of a case study in the Stellenbosch area, the dynamics behind the knowledge-driven industry's significant decision to locate within a region peripheral to a large metropolitan area.

Furthermore, the degree to which Stellenbosch's position as university town influenced the locational decision-making of participating industries will be investigated. In addition, the research aims to identify the ways in which proximity to Stellenbosch University benefits these industries whose development is often greatly dependent on innovation and knowledge transfers. The following chapter sets the groundwork for the empirical part of the research by explaining the data collection process.

CHAPTER 3: DATABASE CONSTRUCTION

A study of knowledge-based service activities in Stellenbosch firstly required a list of existing service sector businesses to serve as population for questionnaire distribution and data gathering. Several possible sources were identified and followed up with varying levels of success. The data sourcing process will be discussed by deliberating each source individually. Secondly, the discussion will turn towards the identified classification criteria for the inclusion of establishments in the population based on the degree to which business activities adhered to the definition and criteria of knowledge-based services.

3.1 DATA SOURCING

Several data source providers were initially identified from which a list of service industries could possibly be obtained. However, each of these providers presented their own set of restrictions. The lack of a single complete source eventually necessitated the compilation of an accurate up-to-date database by combining and updating several of the incomplete existing sources from different providers. The different source providers and their associated restrictions will each in turn be discussed.

3.1.1 Cape Winelands District Municipality

A review of local government policies revealed the existence of a services sector study commissioned by the Cape Winelands District Municipality (CWDM) in 2006, with the aim of analysing the performance of firms within the District's financial, retail, property and transport services sector (CWDM 2006b). The study used a Regional Services Council (RSC) levy database provided by the CWDM as main data source. The same levy database was obtained from a LED manager at CWDM for the purpose of this research study. Though the database was useful in providing an extensive list of Stellenbosch businesses categorised by economic sector, the information was based on levy payments made during the financial year of 2005/2006 and as such the list was outdated and incomplete. It did, however, serve as primary source and starting point in the compilation of a more extensive database.

3.1.2 Stellenbosch Municipality

In an attempt to find a more recent source than the levy payment database, the city planning and billing departments of Stellenbosch Municipality were contacted. At that point in time, however, the local municipality had no records of service establishments available.

3.1.3 South African Revenue Service

The South African Revenue Service (SARS) was considered a likely source of complete and up-to-date records of local businesses. The Bellville SARS branch was contacted but could not provide any information, stating that their records were not geographically identifiable.

3.1.4 Companies and Intellectual Property Registration Office

The Companies and Intellectual Property Registration Office (CIPRO), a business agency under the jurisdiction of the Department of Trade and Industry (DTI), provides fee-based public records of all registered companies. Following the required website registration to request copies of company records, the Pretoria-based CIPRO office was contacted by email, fax, phone and post in an attempt to purchase records for all businesses registered in Stellenbosch. No response or information was received despite several attempts to confirm the request for records. Time constraints eventually did not allow the further exploration of this avenue. An additional drawback lay in the fact that businesses with multiple branches do not register each branch and such records would likely refer to the location of the company's headquarters. Consequently, should registered company records have been obtained from CIPRO the list of Stellenbosch-based companies would still be incomplete.

3.1.5 Local Chamber of Commerce

The local Chamber of Commerce was ruled out as a potential data source provider based on the fact that membership is optional and dependent on an annual membership fee.

3.1.6 Business directories and Yellow Pages

After pursuing all the above-mentioned options it was confirmed that, for the purpose of this study, the CWDM's levy database was the most reliable official source of Stellenbosch service sector establishments available at the time. This database was further supplemented by including all additional businesses found in the local phonebook, online business directories such as Brabys (<http://www.brabys.co.za/>) and both the online and published versions of the 2007 Yellow Pages. The inclusion of establishments from these directories proved problematic since the nature of an establishment's business activities could in many cases not be identified from the company name or listing details alone. It is also noted that these directories do not list all the businesses in Stellenbosch.

3.1.7 Personal observation

With the CWDM levy database as primary point of departure and additional businesses identified and included from business directories, a final method of building on the existing list of establishments was by personal observation. Several unlisted businesses were discovered merely by driving through Stellenbosch and visiting all known office parks within and beyond the town centre.

Though headway was made in terms of obtaining sources to construct a database of existing Stellenbosch-based service establishments, the question remained which of these establishments could be specifically defined as knowledge-based service industries. It was thus necessary to identify inclusion criteria in order to refine the existing data.

3.2 INCLUSION CRITERIA

Due to the extensive nature of the service industry and the subsequent difficulty in categorizing the numerous economic activities which constitute the tertiary sector, it was necessary to define certain criteria for the inclusion of businesses within the research population. To determine which businesses would qualify for inclusion in the Stellenbosch case study, the Standard Industrial Classification (SIC) index served as primary guideline. In addition, a working

definition of knowledge-based service activities was used to further narrow down the businesses in the existing database.

3.2.1 The Standard Industrial Classification index

The Standard Industrial Classification (SIC) index consists of a collection of codes, prescribed by the Department of International Economic and Social Affairs of the United Nations, for the standardized classification of economic activities (CIPRO 2008). It is an internationally accepted “framework for the collection, tabulation, analysis and presentation of statistical data on establishments...[and]...promotes the uniformity and comparability of statistics compiled from different sources.” (STATSSA 1993: n.p.) The SIC hierarchically divides economic activities into eight *Major Divisions* (Table 3.1.) which is subsequently subdivided into *Divisions*, *Major Groups*, *Groups* and *Subgroups* resulting in a 5-digit number classification (see Appendix C for the complete SIC index). Before the establishment of the DTI’s Company Intellectual Property and Registration Office (CIPRO)¹⁰ in March 2002, only *Major Divisions* were used in the classification of registered enterprises (Table 3.1.). Since then, CIPRO has slowly started extending their database to include the second digit (*Division*) into their classifications (CIPRO 2008). As a result of the intricate nature of service industry classification and a lack of in-depth knowledge of all the business activities of Stellenbosch establishments, highly detailed classification was unfeasible. Consequently, only activities described in *Major Divisions*, *Divisions* and, to a lesser extent, *Major Groups* were used as guidelines for the taxonomy and subsequent inclusion or exclusion of Stellenbosch establishments in the research population.

Major Division 8 includes all activities related to *Financial Intermediation*, *Insurance*, *Real Estate* (also referred to as FIRE activities) and *Other Business Services*, thus constituting the vast majority of knowledge-based services. Hence, for the purpose of this study, all establishments partaking in a business activity listed in *Major Division 8* of the sixth edition of the SIC were included in the population with only the following exceptions:

¹⁰ CIPRO was the result of a merger between the South African Companies Registration Office (SACRO) and South African Patents & Trade Marks Office (SAPTO)

- All activities that involve the renting of machinery and equipment, without operator, and of personal and household goods¹¹.
- The maintenance and repair of office, accounting and computing machinery¹².
- *Investigation and Security Activities*¹³, *Building and Industrial Plant Cleaning Activities*¹⁴ and *Packaging Activities*¹⁵, as categorized under *Business Activities*¹⁶.

Table 3.1 Eight *Major Divisions* of SIC 6th edition (STATSSA 2005: 24)

STANDARD INDUSTRIAL CLASSIFICATION (SIC) – MAJOR DIVISIONS	
MAJOR DIVISION 1:	AGRICULTURE, HUNTING, FORESTRY AND FISHING
MAJOR DIVISION 2:	MINING AND QUARRYING
MAJOR DIVISION 3:	MANUFACTURING
MAJOR DIVISION 4:	ELECTRICITY, GAS AND WATER SUPPLY
MAJOR DIVISION 5:	CONSTRUCTION
MAJOR DIVISION 6:	WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES, MOTOR CYCLES AND PERSONAL AND HOUSEHOLD GOODS; HOTELS AND RESTAURANTS
MAJOR DIVISION 7:	TRANSPORT, STORAGE AND COMMUNICATION
MAJOR DIVISION 8:	FINANCIAL INTERMEDIATION, INSURANCE, REAL ESTATE AND BUSINESS SERVICES
MAJOR DIVISION 9:	COMMUNITY, SOCIAL AND PERSONAL SERVICES
MAJOR DIVISION 0:	PRIVATE HOUSEHOLDS AS EMPLOYERS AND UNDIFFERENTIATED PRODUCTION ACTIVITIES OF PRIVATE HOUSEHOLDS, EXTERRITORIAL ORGANISATIONS, REPRESENTATIVES OF FOREIGN GOVERNMENTS <i>NOT ECONOMICALLY ACTIVE PEOPLE, BEGGARS, PEOPLE LIVING FROM HANDOUTS AND CHARITY, UNEMPLOYED PEOPLE, PEOPLE SEEKING WORK, UNSPECIFIED ACTIVITIES AND OTHER ACTIVITIES NOT ADEQUATELY DEFINED</i>

The exclusions were based on the premise that these activities do not adequately reflect the criteria derived from the working definition of knowledge-based services deduced from the literature. These criteria will be discussed in section 3.1.2. Only one activity not listed under *Major Division 8* was included as a knowledge-based service activity for the purpose of this

¹¹ Division 85

¹² Major Group 865

¹³ Group 8892

¹⁴ Group 8893

¹⁵ Group 8895

¹⁶ The following groups categorized under *Business Activities* (*Major Group 889*) were including as activity-based criteria for the inclusion of establishments in the research population: *Labour Recruitment and Provision of Personnel* (*Group 8891*), *Photographic Activities* (*Group 8894*) and *Other Business Activities* (*Group 889*).

study, namely *Publishing*¹⁷ which was taken from the *Manufacturing* sector (*Major Division 3*). Table 3.2 identifies all economic activities classified as knowledge-based services for the purpose of this study. These activities served as determining criteria in considering establishments for inclusion or exclusion in the research population.

The CWDM's 2005/2006 levy payment database, already identified as the most comprehensive obtainable source of Stellenbosch business establishments, was divided into economic sectors and subsectors according to the SIC index. It thus seemed logical to use the SIC as the basis for categorising business establishments for the purpose of compiling a research population. Consequently all businesses listed under *Major Division 8* in the CWDM's levy payment database (with the mentioned exceptions) were extracted for use in this study. Furthermore, based on the international acceptance of the SIC, most national and provincial statistical data related to economic sectors are calculated per *Major Division* as defined by the SIC classification framework, for example, contributions per economic sector to national GDP. Utilizing the SIC categories as the main classification criteria for the compilation of a research population could thus later enhance the applicability and accuracy of inferences drawn from research results.

3.2.2 A working definition of knowledge-based service activities

To refine the chosen inclusion criteria as defined by *Major Division 8* of the SIC index, a definition of knowledge-intensive services was further used to establish inclusion or exclusion of establishments. This proved to be of particular importance in cases where business activities, despite being classified within *Major Division 8* of the SIC, were not considered to be 'knowledge-based'. Consequently, in addition to being involved in a SIC-listed activity, a business also had to adhere to certain criteria taken from definitions of knowledge-based services derived from the literature.

¹⁷ Major Group 325

Table 3.2 Activity-based criteria for database inclusion as derived from *Major Division 8 (Financial Intermediation, Insurance, Real Estate and Business Services)* of the Standard Industrial Classification (SIC) (STATSSA 2005)

MAJOR DIVISION 8: FINANCIAL INTERMEDIATION, INSURANCE, REAL ESTATE AND BUSINESS SERVICES	Division	Major Group	Included
FINANCIAL INTERMEDIATION, EXCEPT INSURANCE AND PENSION FUNDING	81		✓
Monetary intermediation		811	✓
Other financial intermediation n.e.c.		819	✓
INSURANCE AND PENSION FUNDING, EXCEPT COMPULSORY SOCIAL SECURITY	82	821	✓
ACTIVITIES AUXILIARY TO FINANCIAL INTERMEDIATION	83		✓
<i>Activities auxiliary to Financial Intermediation, except insurance and pension funding</i>		831	✓
Activities auxiliary to insurance and pension funding		832	✓
REAL ESTATE ACTIVITIES	84		✓
<i>Real Estate activities with own or leased property</i>		841	✓
<i>Real Estate activities on a fee or contract basis</i>		842	✓
RENTING OF MACHINERY AND EQUIPMENT, WITHOUT OPERATOR, AND OF PERSONAL AND HOUSEHOLD GOODS	85		×
Renting of transport equipment		851	×
Renting of other machinery and equipment		852	×
Renting of personal and household goods		853	×
COMPUTER AND RELATED ACTIVITIES	86		✓
Hardware consultancy		861	✓
Software consultancy, publishing and supply		862	✓
Data processing		863	✓
Data base activities and on-line distribution of electronic content		864	✓
Maintenance and repair of office, accounting and computing machinery		865	×
Other computer -related activities		869	✓
RESEARCH AND EXPERIMENTAL DEVELOPMENT	87		✓
Research and experimental development of natural sciences and engineering (NSE): <i>Including General, Agricultural and livestock, Medical and veterinary, Industrial, Biotechnological and other research</i>		871	✓
Research and experimental development of social sciences and humanities (SSH)		872	✓
OTHER BUSINESS ACTIVITIES	88		✓
Legal, accounting, bookkeeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy activities		881	✓
Architectural, engineering and other technical consultants activities		882	✓
Advertising		883	✓
Business activities: <i>Including Labour recruitment and provision of personnel (Group 8891), Photographic activities (Group 8894) and Other business activities (Group 889). Excluding Investigation and security activities (Group 8892), Building and industrial plant cleaning activities (Group 8893) and Packaging activities (Group 8895)</i>		889	✓
MAJOR DIVISION 3: MANUFACTURING	Division	Major Group	Included
Publishing		325	✓

To be included in the population, in addition to its involvement in any activities listed in the SIC *Major Division 8*, a business had to:

- Be directly involved in the provision of activities which increase value during different stages of the production process of goods or services produced by other firms (Coffey & Shearmur 1997; Shearmur & Doloreux 2007).
- Provide a more durable ‘high-order’ service involving “the processing and synthesis of often complex and non-standard information” (Shearmur & Doloreux 2007: 3).
- Specialize in ‘knowledge-intensive’ service provision which requires complex intellectual and knowledge-based activities for which the dominant production input is skilled human capital (Aslesen & Jakobsen 2007; Shearmur & Doloreux 2007).

Based on these criteria, establishments involved in the publishing of books, brochures, newspapers, journals, periodicals or music were also included for consideration, despite these activities being listed under *Manufacturing (Major Division 3)*. The main question to be answered was whether the business being considered was directly involved in the generation of new or business-specific knowledge or the provision of data or information, and whether that activity constituted more than 50% of all commercial functions of said business.

3.2.3 Exclusions

Despite being involved in knowledge-based service activities certain business establishments were excluded from the research population.

- The vast majority of manufacturing industries were excluded. Though many high-technology manufacturing industries are knowledge-based and often provide numerous services in addition to production, it was not possible in this study to determine the ratios of production to service provision. The only exception in this regard occurred in the inclusion of certain computer-related establishments where manufactured products were directly dependent on the generation of knowledge, and this function was also fulfilled within the same company, i.e. software development.

- Despite being definable as knowledge-based service industries, establishments with branches in the majority of towns in the Western Cape were excluded from the population because their location in Stellenbosch was not significant. With the exception of head offices, contributions by these establishments regarding business location decision-making would not notably contribute to a better understanding of the Stellenbosch situation. Some examples of such businesses include branches of national and provincial real-estate agents, banks, loaning institutions and photo labs.
- Knowledge-based service establishments falling outside the defined study area were not included. Jamestown was included because of its close proximity to Stellenbosch and Technopark. However, despite falling within the Stellenbosch municipal boundary, businesses establishments in Pniel, Franchhoek, Raithby, Koelenhof, Johannesdal, Kylemore, Klapmuts and the surrounding rural areas were excluded for the purpose of this study based on their geographical location beyond the urban edge of Stellenbosch (Figure 1.2).

3.3 REFINING THE DATABASE

Although the CWDM's RSC levy database proved useful as a primary point of departure in the construction of a research population database, the listed information dated back to the 2005/2006 financial year. Consequently, screening was first necessary to confirm that all the establishments listed still had a fully operational branch located in Stellenbosch at the time of the study (2008). Secondly, the physical and postal addresses of each establishment had to be confirmed and missing information generated for later mapping and questionnaire distribution purposes. In some cases uncertainty regarding the nature of an establishment's business activities had to be eradicated. All necessary information was obtained through telephonic enquiry. Where numbers were out of use or there was no answer after three attempts at different times of the day, and no other contact details could be found, the business was removed from the database. Table 3.3 outlines the various eliminations from the CWDM's levy payment database.

Table 3.3 Eliminations of businesses from the CWDM's levy payment database

REASONS FOR ELIMINATION	NUMBER OF ESTABLISHMENTS
DISCONNECTED NUMBER	56
NO ANSWER	46
REPEATED / AMALGAMATED	41
CONFIRMED TO BE NO LONGER OPERATIONAL	11
NOT SITUATED IN STUDY AREA ¹⁸	71
EXCLUDED BASED ON SIC ACTIVITY-BASED CRITERIA	66
WRONG NUMBER	22
TOTAL ELIMINATED	313
TOTAL OPERATIONAL AT TIME OF STUDY¹⁹	185
TOTAL IN CWDM DATABASE	498

From the total of 498 establishments listed under *Major Division 8* in the 2005/2006 CWDM's RSC levy payments database only 185 were confirmed to still be operational within the study area and adhered to the SIC activity-based criteria for inclusion or exclusion in the research population (Table 3.2). After further refinement and consideration of criteria based on the working definition of knowledge-based service industries, this number decreased to 167. An additional 147 service establishments were identified from either telephone or internet business directories, the Yellow Pages or personal observation within the study area (Table 3.4).

Table 3.4 Summary of inclusions in the research population database

INCLUSIONS	NUMBER OF ESTABLISHMENTS
OPERATIONAL BUSINESSES LISTED IN CWDM LEVY PAYMENT DATABASE	167
IDENTIFIED FROM TELEPHONE OR ONLINE BUSINESS DIRECTORIES AND/OR PERSONAL OBSERVATION	147
TOTAL INCLUDED FOR QUESTIONNAIRE DISTRIBUTION AND SUBSEQUENT DATA ANALYSES:	314
IDENTIFIED DURING FIELDWORK	15
TOTAL IN DATABASE (FOR MAPPING AND SPATIAL ANALYSES)	329

The final database included a total 314 knowledge-based service establishments which formed the research population. During the distribution of questionnaires amongst these 314 businesses

¹⁸ The CWDM includes the Witzenberg, Drakenstein, Stellenbosch, Breede Valley, and Breede River/ Winelands Local Municipalities. The study area only includes the built-up area of the town of Stellenbosch within the Stellenbosch Municipal border.

¹⁹ Establishments operational in Stellenbosch between January and July 2008.

another 15 service establishments were identified in the study area qualifying for inclusion in the database leading to a total of 329 establishments in the final database. The additional 15 businesses were added and included for mapping purposes but were excluded from the analysis of data derived from questionnaires distribution. The final research population in the constructed database can be seen in Appendix D.

3.4 THE SPATIAL DISTRIBUTION OF THE RESEARCH POPULATION

The research centres on the significant question why knowledge-based service establishments prefer to locate in the town of Stellenbosch, when they have the option of locating in any other town, a larger urban centre such as Cape Town, or one of its fast-developing suburbs. The study thus concerns itself with locational aspects pertaining to local to regional level. However, though not of primary concern, a visual representation of the spatial distribution of service establishments within the boundaries of the Stellenbosch study area itself, allows the use of spatial analysis tools that could compliment the statistical data to be obtained through questionnaire distribution. Accordingly, GPS coordinates were collected for the majority of service establishments within the identified Stellenbosch research population to allow the composition of maps in ESRI's ArcMap software. A detailed description of the methodology used for the GPS collection and mapping process has already been described in Section 1.4.4 of Chapter One.

Figure 3.1 illustrates the spatial distribution of 324 of the total identified population of 329 knowledge-based service industries in the Stellenbosch study area. Three clusters can be identified of which two lie within the central business district (CBD) and the largest in Technopark office park. There is also an identifiable linear cluster along Dorp Street which, as the oldest street in town, boasts historic architecture and epitomizes the town's sense of place. The two CBD clusters are divided by Bird Street, one of the main entrance roads into Stellenbosch. A second map (Figure 3.2) shows the location of the 104 establishments that completed the distributed questionnaires, indicating the spatial distribution of participants as relatively equal when compared to Figure 3.1. More detailed spatial analysis of distribution patterns are referred to in later chapters.

**SPATIAL DISTRIBUTION OF KNOWLEDGE-BASED SERVICE ESTABLISHMENTS
WITHIN THE STELLENBOSCH STUDY AREA**

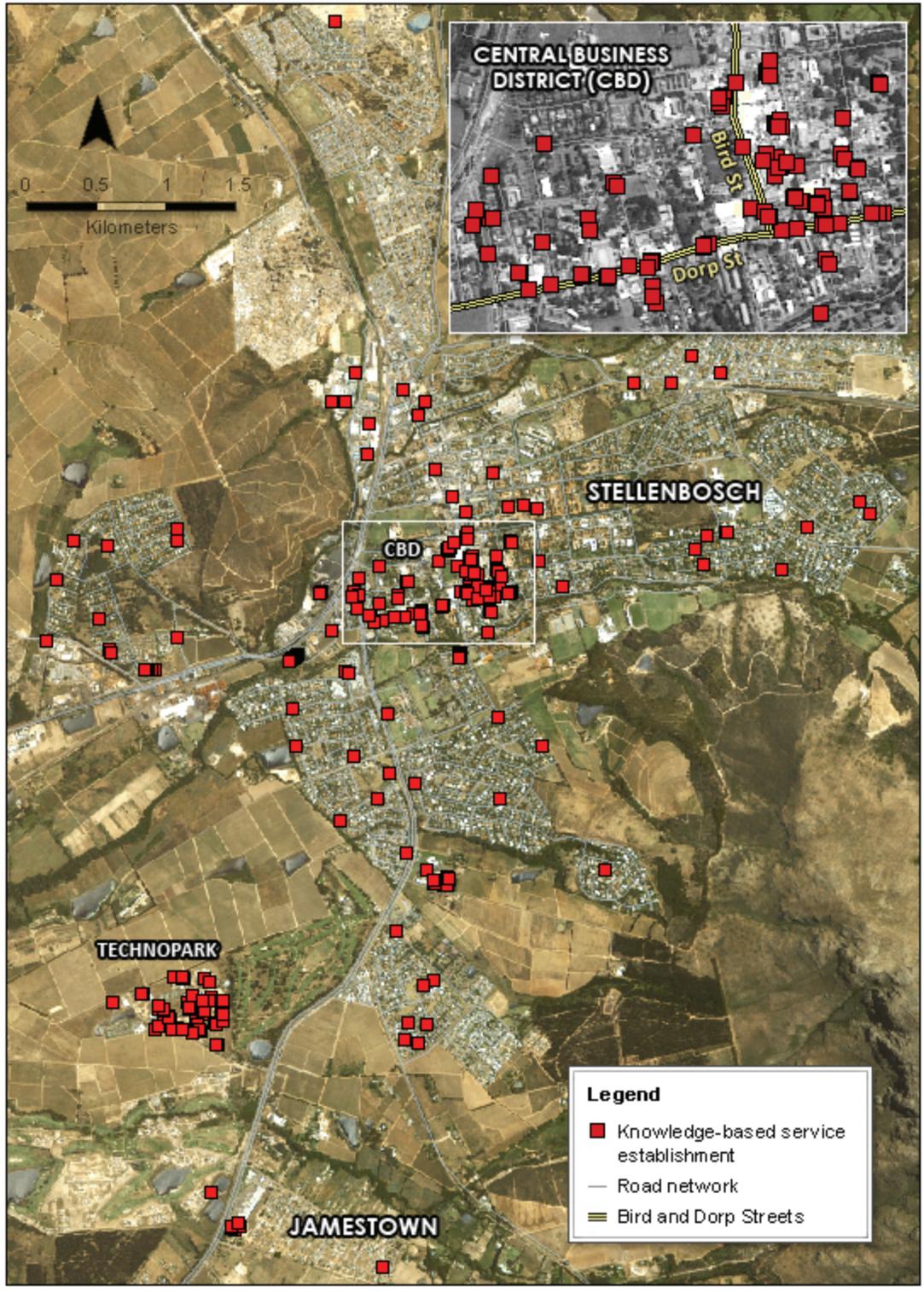


Figure 3.1 Spatial distribution of knowledge-based service industries in the Stellenbosch study area

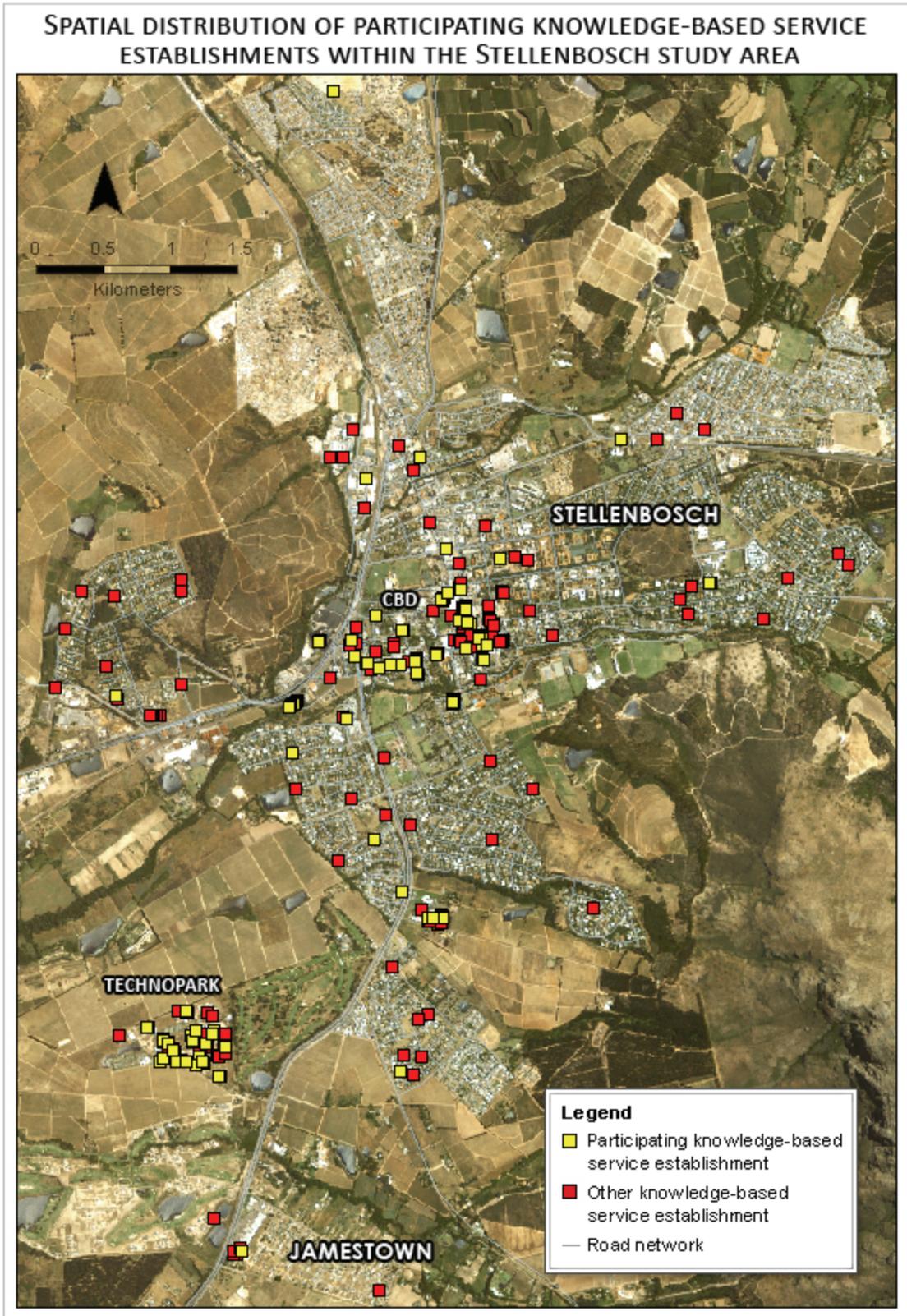


Figure 3.2 Spatial distribution of participating knowledge-based service industries in the Stellenbosch study area

3.5 CONCLUSION

The constructed database of operational knowledge-based service establishments in Stellenbosch formed the primary data source underpinning the empirical case study. Although it is likely that not all operational service industries were identified, the database not only provided an adequate research population for the distribution of questionnaires, but indicated the significant prevalence of these industry types in Stellenbosch.

The discussion will now turn towards the analysis and interpretation of data retrieved from the 104 participating establishments. The case study component of this research centres around three main aims. Firstly, the study demands a basic overview of the local knowledge-based service sector. Chapter Four provides a general description of the basic profile of the establishments comprising this specific subsector of the service industry. Secondly, the main research question is addressed in Chapter Five where the discussion focuses on the dynamics of Stellenbosch as business location by evaluating the significance of individual factors in regards to their impact on the locational decision-making process of knowledge-based service sector establishments. Finally, Chapter Six deals with the nature and extent of university-industry collaboration by identifying the different types of relationships that exist between Stellenbosch University and local business establishments.

CHAPTER 4: A BUSINESS PROFILE OF THE KNOWLEDGE-BASED SERVICE SECTOR IN STELLENBOSCH

The third research objective of this study entailed the description of the nature and extent of the knowledge-based service sector in Stellenbosch. Before investigating the motivation behind the decision of industries to locate in Stellenbosch, it is necessary to give a broad overview of the different categories of businesses activities undertaken by knowledge-based service industries situated in the study area. Furthermore, the prevalence of local, national and international branch types will be determined as well as the time these industries have been operational in Stellenbosch. Finally, the discussion will turn to an evaluation of literature-based characteristics of knowledge-based service industries by identifying the degree to which an educated workforce, information technology (IT), face-to-face consultation, research and development (R&D), and other factors strongly associated with the knowledge-based service sector, actually contribute to the successful operation of the participating establishments.

4.1 BUSINESS ACTIVITY CATEGORIES

Questionnaire responses were received from business establishments ranging across all the major group categories defined under *Major Division 8* of the Standard Industrial Classification (SIC) index. Broadly defined, *Major Division 8* comprises business activities related to *Financial Intermediation, Insurance, Real Estate and Other Business Activities*. Table 3.2 in Chapter Three provides a detailed breakdown of business activities included in the definition of knowledge-based service industries used for the purpose of this case study. Due to the difficulty of distinguishing between *Financial Intermediation* and *Activities auxiliary to Financial Intermediation*, these two options were grouped together resulting in seven final categories included in the research questionnaire. Participants in the Stellenbosch case study were thus required to categorize their business under the most appropriate knowledge-based activity group, choosing between 1) *Financial Intermediation and Auxiliary Activities*, 2) *Insurance and Pension Funding*, 3) *Real Estate Activities*, 4) *Computer and Related Activities*, 5) *Research and Experimental Development* and 6) *Other Business Activities*. Figure 4.1 shows the distribution of participating Stellenbosch establishments across these business categories.

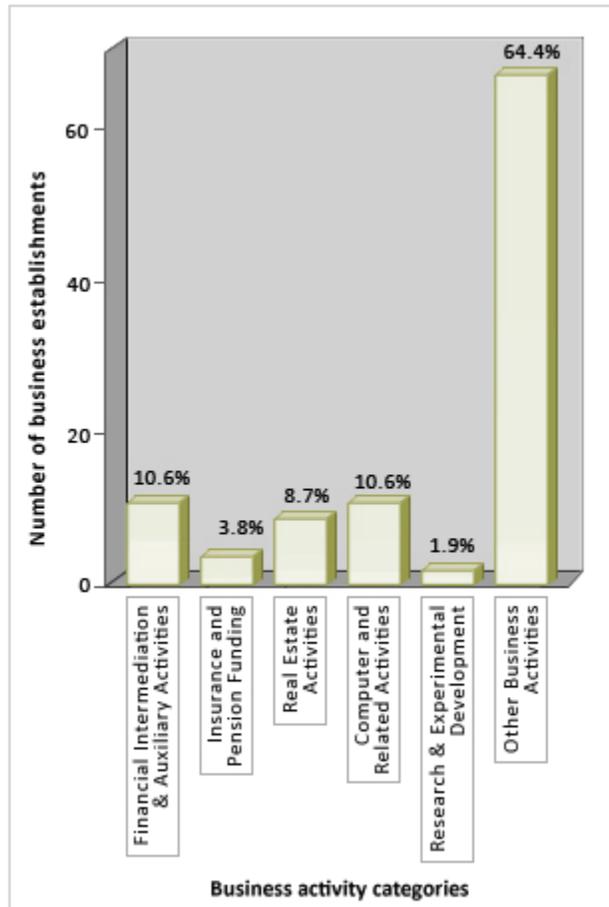


Figure 4.1 Distribution of Stellenbosch establishments across business activity categories (n=104)

The skew distribution of businesses, with the greater majority (64.4%) of establishments categorizing themselves under *Other Business Activities*, necessitated a further breakdown of this group to shed better light on the types of knowledge-driven industries operating in the Stellenbosch service sector. Participants categorizing their main line of business under *Other Business Activities* were required to specify the nature of their services activities. As a result, the following more general subcategories were derived to facilitate further data analysis: *Legal, Accounting, Architectural, Engineering, Technological Development, Business Consultancy, Environmental Management, Marketing, Creative Industries* and *Administrative* activities. Table 4.1 provides a breakdown of activities specified by participants and their categorization into subcategories. Though most of the specified activities are listed in the SIC index's Major Division 8, the subcategories are not directly based on SIC divisions or groups. Within the subcategorised *Other Business Activities* group, *Architectural* and *Business Consultancy*

activities constitute the highest percentage of business establishments with 13.4% each. The subcategory with the lowest contribution of 3% constitutes establishments with *Administrative* activities as their main line of business (Table 4.1).

Combining the newly subcategorised *Other Business Activities* group with the original main categories provides a more equal distribution of business types and gives a clearer picture of the prevalence of specific types of service establishments in Stellenbosch (Figure 4.2). Most of the knowledge-based service establishments in Stellenbosch fall within *Financial Intermediation* and *Computer and Related Activities* sectors which each constitute 10.6% of the total number of participating establishments. *Real Estate*, *Architectural* and *Business Consultancy* activities also equally contribute 8.7% each. As one of the smallest constituents, *Research & Experimental Development* made up only 1.9% of participants along with *Administrative* establishments.

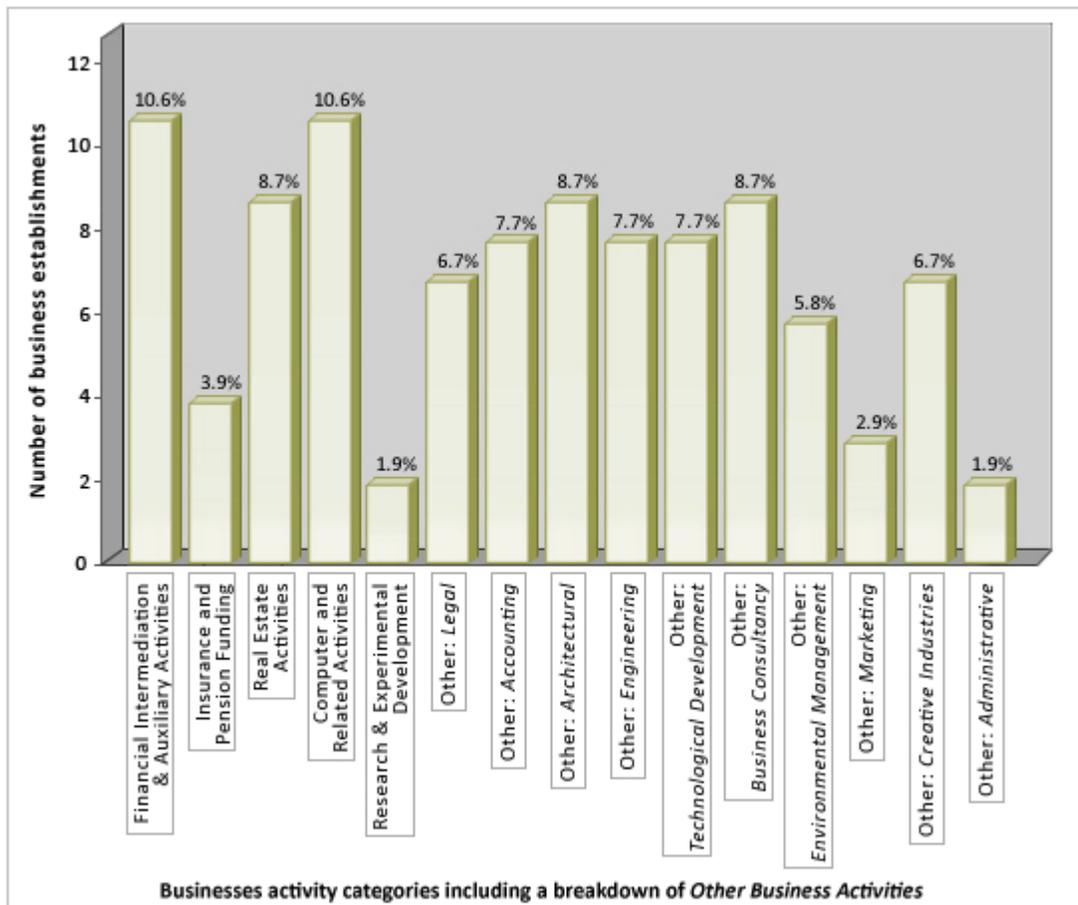


Figure 4.2 Distribution of Stellenbosch establishments across main business activity categories and *Other Business Activities* subcategories (n=104)

Table 4.1 Breakdown of *Other Business Activities* into subcategories

OTHER BUSINESS ACTIVITIES SUBCATEGORIES	OTHER BUSINESS ACTIVITIES SPECIFIED BY PARTICIPANTS	NUMBER OF ESTABLISHMENTS	PERCENTAGE OF OTHER BUSINESS ACTIVITIES CATEGORY
LEGAL	LEGAL	7	10.4%
	TOTAL	7	10.4%
ACCOUNTING	ACCOUNTING/TAX/FINANCIAL	8	11.9%
	TOTAL	8	11.9%
ARCHITECTURAL	QUANTITY SURVEYOR	2	3%
	ARCHITECT	7	10.4%
	TOTAL	9	13.4%
ENGINEERING	ENGINEER - MECHANICAL	1	1.5%
	ENGINEER - ELECTRICAL	1	1.5%
	ENGINEER - CIVIL	4	6%
	ENGINEER - MULTIPLE	2	3%
	TOTAL	8	11.9%
TECHNOLOGICAL DEVELOPMENT	TECHNOLOGY - MEDICAL	1	1.5%
	TECHNOLOGY - RADAR/ SATELLITE	2	3%
	ELECTRONIC/INDUSTRIAL DESIGN/DEVELOPMENT	4	6%
	LABORATORY TESTING	1	1.5%
	TOTAL	8	11.9%
BUSINESS CONSULTANCY	CONSULTANT - TRANSPORT	1	1.5%
	CONSULTANTS - SECURITY	1	1.5%
	CONSULTANT - IMMIGRATION	1	1.5%
	CONSULTANTS - BUSINESS/ DEVELOPMENT	3	4.5%
	CONSULTANTS – GEOGRAPHIC INFORMATION	3	4.5%
	TOTAL	9	13.4%
ENVIRONMENTAL MANAGEMENT	CONSERVATION (NGOs)	2	3%
	GEOLOGICAL ACTIVITIES	1	1.5%
	CONSULTANT-WINE/AGRICULTURE	1	1.5%
	CONSULTANTS - ENVIRONMENTAL	2	3%
	TOTAL	6	9%
MARKETING	MARKETING	3	4.5%
	TOTAL	3	4.5%
CREATIVE INDUSTRIES	PHOTOGRAPHY	1	1.5%
	GRAPHIC/ WEB DESIGN AND ADVERTISING	4	6%
	PRINTING/PUBLISHING	1	1.5%
	TRANSLATION	1	1.5%
	TOTAL	7	10.5%
ADMINISTRATIVE	ADMINISTRATIVE/MANAGEMENT HEAD OFFICE	1	1.5%
	PROCUREMENT & EXPORT ACTIVITIES	1	1.5%
	TOTAL	2	3%
TOTAL		67	100%

Figure 4.3 shows the spatial distribution of study participants within Stellenbosch, colour-coded according to business activity category. It is interesting to note the geographic concentration of *Real Estate* establishments in the historic part of the CBD. As mentioned in Chapter Three, Dorp Street, with its extensive history and Cape Dutch architecture, is generally considered to be the heart of central Stellenbosch and has subsequently become synonymous with the town's sense of place. It is likely that the aesthetics, status and historic richness of this area, in addition to being the centre of town with a constant walkthrough of locals and tourists, provide ample motivation for *Real Estate* businesses to choose this specific location in Stellenbosch. Figure 4.3 also highlights a spatially clustered group of *Technological Development* industries in Technopark. The significance of this spatial pattern, as well as the significance of a prestigious street address or office park as motivating factor in the locational decision-making of knowledge-based service industries in Stellenbosch, is further discussed in Section 5.2.5 of Chapter 5.

4.2 BUSINESS BRANCH TYPES

The second important component in establishing a general profile of knowledge-based service establishments involved the identification of different types of branches. The majority of participating establishments (62.5%) are single branch businesses with no other operational offices outside of Stellenbosch (Figure 4.4). A national branch, for the purpose of this study, is defined as an operational office - other than the official head office - of a company with more than one physical office in South Africa. Similarly, an international branch refers to an operational office - other than the official head office - of a company with physical offices in more than one country. An international branch office could, however, refer to the only operational office within South Africa as long as the company have at least one other physical branch situated in another country.

**SPATIAL DISTRIBUTION OF PARTICIPATING STELLENBOSCH ESTABLISHMENTS
ACCORDING TO BUSINESS ACTIVITY CATEGORY**

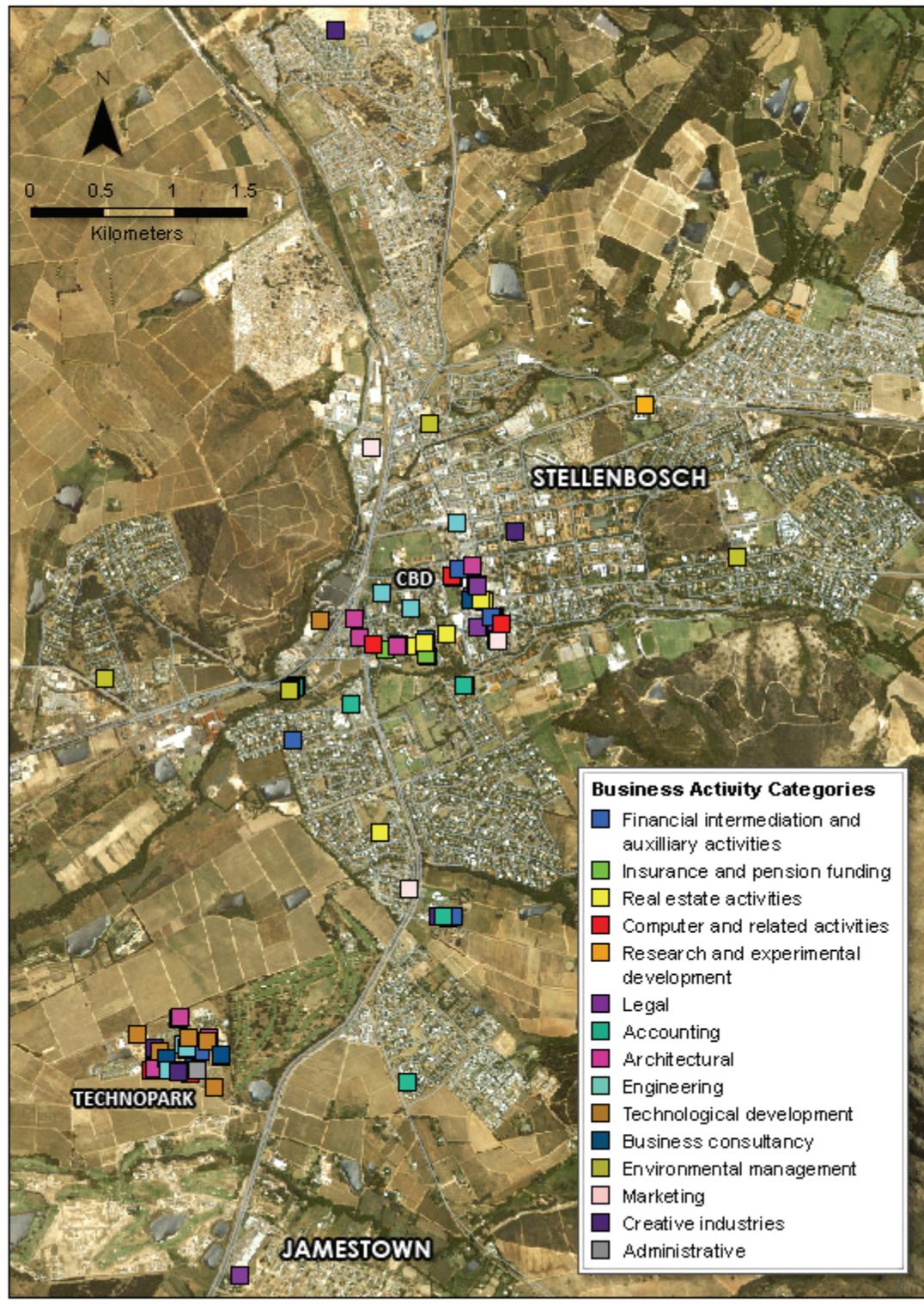


Figure 4.3 Spatial distribution of participating Stellenbosch establishments according to business activity category

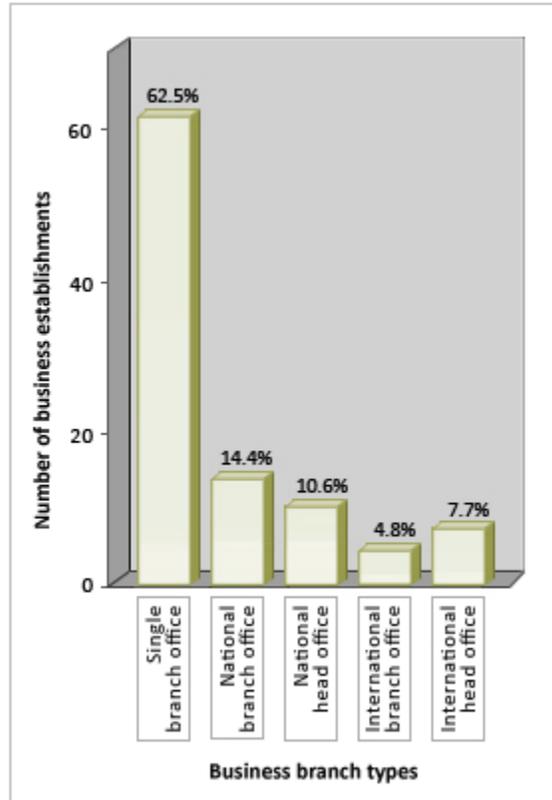


Figure 4.4 Branch types of knowledge-based service establishments in Stellenbosch (n=104)

The prevalence of single branches is particularly noticeable within *Real Estate*, *Legal*, and *Creative Industries* where these branches constitute more than 80% of their respective business activity categories (Table 4.2). National branch offices constitute 14.4% of participants, with a higher prevalence amongst R&D industries (50%)²⁰, *Engineering* establishments (37.5%) and *Business Consultancies* (33.3%). It is interesting to note that there is a greater prevalence of international head offices than international branches in Stellenbosch (Figure 4.4). Furthermore, Table 4.2 indicates a higher occurrence of both national and international head offices within *Computer and Related Activities* (18.2% and 36.4% respectively) and *Marketing* establishments (66.7% and 33.3%). The dominance of head offices of computer-related establishments situated in town could confirm the important contribution of IT industries in successfully stimulating investment in Stellenbosch as proposed by Rogerson (2000).

²⁰ Data pertaining to R&D industries could be misleading due to the limited number of 2 participants per category

Table 4.2 Distribution of branch types across each business activity category (industry type)

BUSINESS CATEGORY	SINGLE BRANCH	NATIONAL BRANCH	NATIONAL HEAD OFFICE	INTERNATIONAL BRANCH	INTERNATIONAL HEAD OFFICE
FINANCIAL INTERMEDIATION & AUXILIARY ACTIVITIES	72.7%	18.2%	9.1%	0%	0%
INSURANCE & PENSION FUNDING	50%	0%	0%	50%	0%
REAL ESTATE ACTIVITIES	88.9%	0%	11.1%	0%	0%
COMPUTER AND RELATED ACTIVITIES	36.4%	0%	18.2%	9.1%	36.4%
RESEARCH & EXPERIMENTAL DEVELOPMENT*	50%	50%	0%	0%	0%
OTHER BUSINESS ACTIVITIES (combined)	62.7%	17.9%	10.4%	3%	6%
OTHER BUSINESS ACTIVITIES (separate):					
LEGAL	85.7%	14.3%	0%	0%	0%
ACCOUNTING	50%	12.5%	25%	12.5%	0%
ARCHITECTURAL	77.8%	22.2%	0%	0%	0%
ENGINEERS	62.5%	37.5%	0%	0%	0%
TECHNOLOGICAL DEVELOPMENT	62.5%	25%	12.5%	0%	0%
BUSINESS CONSULTANCY	55.6%	33.3%	11.1%	0%	0%
ENVIRONMENTAL MANAGEMENT	66.7%	0%	16.7%	0%	16.7%
MARKETING	0%	0%	66.7%	0%	33.3%
CREATIVE INDUSTRIES	85.7%	0%	0%	0%	14.3%
ADMINISTRATIVE	0%	0%	0%	50%	50%
TOTAL PERCENTAGE (within categories combined)	62.5%	14.4%	10.6%	4.8%	7.7%

Bold figures are referred to in discussion

4.3 TIME IN OPERATION

Figure 4.5 indicates the time that participating establishments have been operational in Stellenbosch. The graph illustrates the majority of establishments (33.7%) have been in business for 9 to 14 years having been established between the beginning of 1994 and the end of 1999.

In order to attempt identifying more significant trends, data pertaining to the time that participating businesses have been operational in Stellenbosch was cross tabulated with branch types. The data in Table 4.3 reveal certain degrees of correspondence between different types of branches and specific start-up periods.

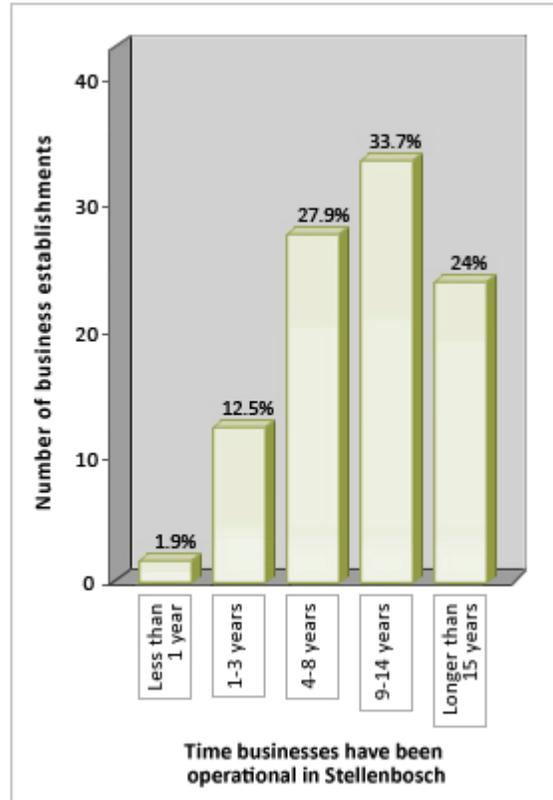


Figure 4.5 Time business branches have been operating in Stellenbosch (n=104)

The vast majority of businesses established between 1994 and 1999 were single branches which at the time of the study still did not have any other physical offices outside of Stellenbosch. In turn, both national branches and national head offices make up 46.7% and 36.4% respectively of all participating businesses established between 2003 and 2000 translating into 4 to 8 years of being operational.

Table 4.3 Time different branch types have been operational in Stellenbosch

YEAR OF ESTABLISHMENT	SINGLE BRANCH	NATIONAL BRANCH	NATIONAL HEAD OFFICE	INTERNATIONAL BRANCH	INTERNATIONAL HEAD OFFICE	TOTAL
2007	1 (1.5%)	1 (6.7%)	0 (0%)	0 (0%)	0 (0%)	2
2004-2006	7 (10.8%)	1 (6.7%)	1 (9.1%)	1 (20%)	3 (37.5%)	13
2000-2003	15 (23.1%)	7 (46.7%)	4 (36.4%)	1 (20%)	2 (25%)	28
1994-1999	27 (41.5%) *	3 (20%)	3 (27.3%)	0 (0%)	2 (25%)	35
BEFORE 1994	15 (23.1%)	3 (20%)	3 (27.3%)	3 (60%)	1 (12.5%)	25
	65	15	11	5	8	104

Bold figures are referred to in discussion

The trend among international branches and head offices is particularly interesting. More than half (60%) of participating international branches have been operational in Stellenbosch for over 15 years. These companies fall within the *Financial Intermediation, Insurance and Pension Funding* and *Computer and Related Activities* categories. Conversely, the majority of international head offices (37.5%) have only been established within the last 1-3 years. The number of newly established international head offices shows a slight yet consistent increase over time. Closer analyses indicated that two thirds of these head offices fall within the *Computer and Related Activity* category. In addition, computer-related industry head offices also constitute 50% of all the participating international head offices in Stellenbosch. This once again confirms Rogerson's (2000) prediction of the potential of IT industries to successfully stimulate regional economic development through high-tech industries.

4.4 FACTORS CONTRIBUTING TO THE SUCCESS OF KNOWLEDGE-BASED SERVICE ACTIVITIES

An in-depth study of service sector literature revealed strong emphases on certain recurrent themes pertaining to the nature and successful operation of knowledge-based service industries in the new global economy. The potential benefits of inter-firm networks resulting from close proximity to firms in a similar line of business, the availability of an innovative and highly skilled labour force, easy access to reliable transport infrastructure, the dependence on IT and the dependence of service industries on face-to-face consultation - around which researchers have developed a dichotomous debate - are but a few factors believed to have an imperative influence in ensuring the sustainability of a service establishment. The degree to which many of these factors contribute to the successful achievement of core business activities do, however, vary substantially according to physical location and as such these issues often also play a crucial role in a company's decision to locate at a specific site. To a certain extent this question thus also served as a cross-check item which allowed the testing of consistency between factors rated as crucial in terms of successful business operation, and factors identified as being highly influential in contributing to business location choice (to be discussed in Chapter Five). Table 4.4 indicates the degree to which eight factors were rated in terms of their contribution towards the

successful performance of the core business activities of participating Stellenbosch-based service establishments.

The most important contributing factor identified by participants is their dependence on a highly educated workforce, with 89% of businesses considering it as more than a mere necessity in ensuring the success of their business. Of seemingly equal importance is the requirement of face-to-face consultation with clients. The highest majority of 58% of establishments rated this as crucial to their organisation's success which could suggest a certain degree of dependence on locations proximate to client bases or markets. However, a distinction must be made between face-to-face consultation and proximity to clients. The latter, indicated as a separate factor, was rated as important by a third of participants but crucial to only 16%. The discrepancy between these two seemingly related factors could be linked to the tendency of businesses to increasingly follow project-based approaches with short-to medium term time limitations. Though face-to-face consultation with important current clients is of crucial importance in these situations the temporary nature of these business relationships do not necessarily warrant a company to physically locate close to the client. Another possible scenario involves the necessity of proximity to one or two major clients despite them being situated far from the client base or market. This is likely to be the case for many Stellenbosch establishments having chosen to locate close to an important or long-term client in town to facilitate face-to-face consultation, rather than a larger pool of potential smaller clients situated in Cape Town or other business centres.

Table 4.4 Factors contributing to the successful performance of core business activities

FACTORS CONTRIBUTING TO THE PERFORMANCE OF CORE BUSINESS ACTIVITIES	CRUCIAL TO ORGANISATION'S SUCCESS	IMPORTANT	NECESSARY	BENEFICIAL BUT NOT NECESSARY	NOT IMPORTANT
A HIGHLY EDUCATED WORKFORCE	53%	36%	7%	2%	2%
FACE-TO-FACE CLIENT CONSULTATION	58%	25%	9%	5%	4%
PROXIMITY TO CLIENTS/MARKETS	16%	33%	13%	24%	15%
THE LATEST INFORMATION TECHNOLOGY (IT)	39%	36%	13%	12%	0%
RESEARCH & DEVELOPMENT (R&D)	30%	24%	22%	17%	7%
INTER-FIRM NETWORKS	24%	27%	21%	15%	13%
CONVENIENT TRANSPORT INFRASTRUCTURE	12%	23%	26%	18%	20%
PROXIMITY TO COMPETITORS	6%	17%	4%	19%	55%

Bold figures are referred to in discussion

Another noteworthy requirement for the successful performance of knowledge-driven, service-based business operation is the availability of the latest IT – a factor rated as crucial by 39% of businesses and important by 36%. Service industry literature casts no doubt on the fundamental relationship between knowledge-based service industries and the availability of advanced IT and this assumption is supported by the fact that it is the only factor regarded by all participants as being at least beneficial. Many businesses (30%) also identified R&D as being of crucial importance to their business operations. Further cross-tabulation revealed the majority of these businesses to fall within either *Technological Development* or *Computer and Related Activities* which is to be expected considering these industries' specific dependence on innovative fast-changing technologies.

In a related question companies were asked to indicate the frequency with which IT is used for different business activities (Table 4.5). Almost all participants (99%) indicated that they often use IT for the purposes of communication (i.e. email) and business administration (97.1%). Once again emphasizing the relationship between advanced information and communication technology and the knowledge-based service industry, 85.3% of establishments specified the direct use of IT on a regular basis in performing service provision activities. Furthermore the greater majority (76.2%) also uses IT on a regular basis to conduct research with most participants specifying internet-based research. The majority of businesses (63.4%) also apply IT in the development of products. This trend is most prevalent within *Computer and Related Activity* industries (where products are mostly software-based) and to a lesser extent also *Business Consultancies* and *Creative Industries*. However, at least one business from each business activity category identified their frequent use of IT for product development confirming the importance of this activity and its dependence on IT within a variety of knowledge-based service industries.

Table 4.5 Frequency of IT application in different business activities

ACTIVITY	OFTEN	SOMETIMES	NEVER
COMMUNICATION	99%	1%	0%
BUSINESS ADMINISTRATION	97.1%	2.9%	0%
SERVICE PROVISION	85.3%	7.8%	6.9%
RESEARCH	76.2%	19.8%	4%
PRODUCT DEVELOPMENT	63.4%	17.8%	18.8%

Bold figures are referred to in discussion

Finally, the importance of inter-firm networks – though receiving much attention in the literature – varies in importance amongst Stellenbosch establishments (Table 4.4). It can be assumed that this factor would be more influential in larger urban centres where higher concentrations of firms within similar industries are more prevalent. However, at least one Stellenbosch firm from each business category indicated inter-firm networks to be either crucial or important in their successful operation. *Accounting* as well as *Technological Development* firms in particular seemed to rate this as a crucial consideration whereas *Business Consultancies* and *Computer and Related Activity* industries consider it of importance. This is understandable considering the nature of both Accounting and Business consultancies that are reliant on outsourcing their services to external clients. *Technological Development* and *Computer and Related Activity* industries might also, in addition to using inter-firm networks to generate new clients, benefit from knowledge spillovers through close contact with other industries in similar fields due to their strong dependence on advances in fast-developing IT. However, more in-depth research is necessary to confirm these suggestions.

The importance of convenient infrastructure also seems to vary in importance in terms of its contribution to the successful achievement of core business activities. Finally, proximity to competitors is the only relatively unimportant factor indicated by only 6% of participants as being crucial and just over half of participants as not important at all. The companies constituting the 6% vary in terms of the business categories they belong to. It is possible that proximity to competitors is to a certain degree irrelevant to Stellenbosch-based businesses due to the size of the town. Although a high-tech industry cluster has been identified and the service sector seems to be growing steadily, the overall number of knowledge-based service establishments in Stellenbosch remains low in comparison with the number of service industries in the Cape Town

metropolitan area. It would thus make sense for establishments who deem proximity to competitors to be crucial to the operation of their business to locate themselves in cities or surrounding suburbs where specific industry clusters are likely to be more prevalent.

With closer investigation the importance of the considered factors shows slight variation across different business categories. Table 4.6 ranks each factor based on its average importance as rated by individual business category. The lower the score indicated, the higher the importance of the factor. Although a highly educated work force has the highest average rating in terms of its importance, the majority of categories actually rate face-to-face as the most significant factor influencing the performance of core activities. An educated work force is considered the single most essential factor by industries related to *Financial Intermediation* (1.4) and *Accounting* (1.25) which can be explained by the specialised skills required by these industries. However, *Real Estate* establishments (1.63) also consider this factor to be the most essential which is interesting considering that postgraduate education is not usually a necessary requirement within this industry. Understandably so, *Computer and Related Activities* (1.09) and *Technological Development* establishments (1.14) assign the highest average importance to the availability of the latest IT. It is also the most important contributing factor within *Creative Industries* (1.5) such as web and graphic design agencies, photography studios and publishers. Similarly, it is not surprising that R&D is considered the most important factor ensuring successful business operation within industries specialising in *Research and Experimental Development* (1).

4.5 CONCLUSION

An overview of the nature of the knowledge-based service sector indicates a relatively equal distribution of industries across different activity categories with a slightly higher concentration of financial and computer-related industries. Although the vast majority of industries are single branch businesses, the growing number of national and international head offices, specifically within the *Computer and Related Activities* category, deserves mention. Though most service industries were established between 1994 and 1999, the number of international head offices in the town has been growing steadily. Moving on from the description of the general profile of Stellenbosch knowledge-based service industries, the following chapter entails a detailed analysis of factors that influenced the locational decision-making process of Stellenbosch knowledge-based service establishments.

Table 4.6 Factors contributing to the successful performance of core business activities rated by individual business activity categories

FACTORS CONTRIBUTING TO THE SUCCESSFUL PERFORMANCE OF CORE BUSINESS ACTIVITIES	OVERALL AVERAGE RATING ²¹	FINANCIAL INTERMEDIATION & AUXILIARY ACTIVITIES	INSURANCE & PENSION FUNDING	REAL ESTATE ACTIVITIES	COMPUTER AND RELATED ACTIVITIES	RESEARCH & EXPERIMENTAL DEVELOPMENT	OTHER: LEGAL	OTHER: ACCOUNTING	OTHER: ARCHITECTURAL	OTHER: ENGINEERS	OTHER: TECHNOLOGICAL DEVELOPMENT	OTHER: BUSINESS CONSULTANCY	OTHER: ENVIRONMENTAL MANAGEMENT	OTHER: MARKETING	OTHER: CREATIVE INDUSTRIES	OTHER: ADMINISTRATIVE
A HIGHLY EDUCATED WORKFORCE	1.64	1.4	1.75	1.63	1.45	2	1.83	1.25	1.5	1.5	1.29	1.89	2	1.33	2.17	2
FACE-TO-FACE CLIENT CONSULTATION	1.72	2.1	1	2	2.09	2	1.17	1.38	1.25	1.25	1.86	1.67	1.67	1.33	1.83	3.5
THE LATEST INFORMATION TECHNOLOGY (IT)	1.97	2.3	1.25	2.5	1.09	3	2.17	1.88	2.25	2.25	1.14	2	2.33	2	1.5	1.5
RESEARCH & DEVELOPMENT (R&D)	2.46	2.6	2	2.38	1.91	1	3.17	2.5	2.88	2.75	1.43	2.33	2.5	1.67	2.83	5
INTER-FIRM NETWORKS	2.66	3.1	2.5	2.5	2.73	2.5	3	2.25	2.75	2.63	2	2.56	3.17	1.67	2.83	2.5
PROXIMITY TO CLIENTS/MARKETS	2.89	3.7	1.5	2.63	3.18	3	2.67	2.5	2.38	2.75	3.43	2.56	3.33	3.33	2.33	3.5
CONVENIENT TRANSPORT INFRASTRUCTURE	3.13	3.5	3	3.38	3.45	2.5	3.17	3.63	3.13	2.5	2.57	3.11	2.67	1.33	3.83	3.5
PROXIMITY TO COMPETITORS	4	4.1	3.25	3.5	4.27	2.5	3.33	3.88	3.63	4.25	4	4.22	4.83	3.67	4.83	4.5

Bold figures are referred to in discussion

²¹ 1=Crucial to organisation's success 2=Important 3=Necessary 4=Beneficial but not necessary 5=Not important

CHAPTER 5: THE LOCATIONAL DECISION-MAKING DYNAMICS OF THE STELLENBOSCH KNOWLEDGE-BASED SERVICE SECTOR

The main aim encapsulated by this research is to determine the reasons why Stellenbosch-based knowledge-driven service establishments decided to locate specifically in the town of Stellenbosch. By answering this question it is possible to ascertain whether Stellenbosch possesses specific qualities or resources with the potential to be advantageous to such an extent that it provides adequate incentive for knowledge-driven industries to establish their businesses in town as opposed to other cities or towns. The following discussion identifies these factors and measures the extent to which they influence the locational decision-making processes of the knowledge-based service sector.

5.1 RELOCATION VERSUS PRIMARY LOCATION

Before determining the reasoning behind the decision of business establishments to settle in Stellenbosch, a brief overview of businesses' movement prior to settlement at their current location was necessary to determine the extent to which this influenced the decision-making process. Only 12% of participatory businesses had relocated from other towns or cities in South Africa to Stellenbosch (Figure 5.1). A third of these businesses moved from Cape Town's city centre or the surrounding southern suburbs, a third from other towns in the Western Cape and the remaining third from other provinces, mainly Johannesburg in Gauteng.

Another 15% of participants consisted of secondary branches of businesses which already had established their first branches elsewhere before opening an office in Stellenbosch. The distribution of the head offices of these businesses is illustrated in Figure 5.2. All head offices indicated as being situated in other provinces (50%) are located in Johannesburg or Pretoria in Gauteng. The quarter of head offices situated in other countries show an equal distribution between the United States and United Kingdom.

Head office distribution in the Western Cape has been subject to interesting trends during the past ten years. Central Cape Town as business location suffered in the late 90s when an increase in office development in decentralised nodes in the southern and northern suburbs lead to the relocation of numerous major business branches and regional head offices (Pirie 2007, Turok 2001). Confirming this phenomenon, the Stellenbosch case study indicated that 19% of the head offices of local branches are currently still situated in the northern suburbs of Cape Town (mainly Bellville and Durbanville) as opposed to only 6% of head offices located in Cape Town’s city centre. Recent large-scale rejuvenation of the Cape Town CBD, driven by the city’s private–public redevelopment agency, the Cape Town Partnership (CTP), has re-emphasized Cape Town’s city centre as prime business location. A pronounced financial district is now once again housing the office buildings of numerous large national companies such as Investec, ABSA, Ernst & Young and Metropolitan (Pirie 2007). Re-evaluating the location of head offices in a few years time is likely to reveal interesting new developments.

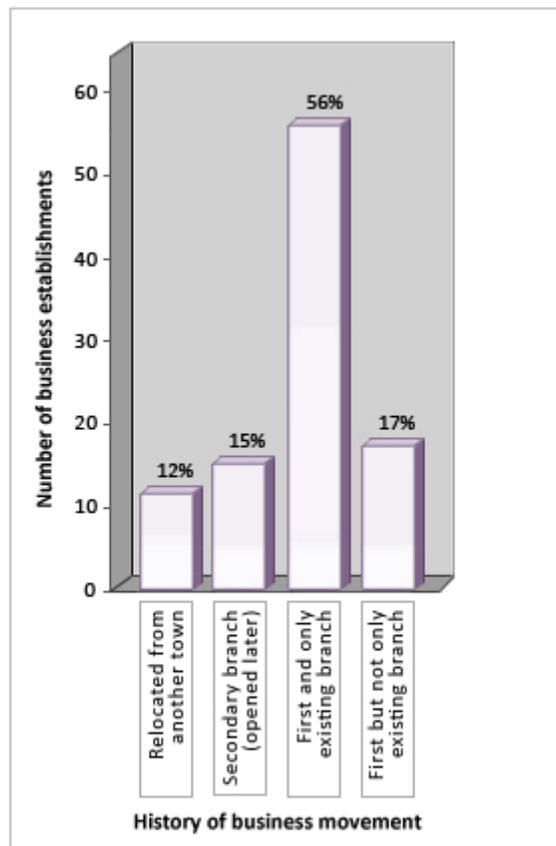


Figure 5.1 Locational histories of Stellenbosch-based service establishments

Figure 5.1 indicates that more than half of participants (56%) are establishments for whom the Stellenbosch branch was the first and remains the only operational office of their business. Another 17% of establishments are original start-up offices of businesses which have, since opening their first branch in Stellenbosch, established other branches elsewhere. This confirms Stellenbosch to be a first choice location for many knowledge-based service industries, indirectly emphasizing one of the main aims of this study, namely to determine the reasons for the appeal of Stellenbosch to these type of service industries.

5.2 FACTORS INFLUENCING BUSINESS LOCATION

Twenty-five factors, which were identified from the literature as having been influential in the decision of a variety of service industries to settle at particular locations, were measured to identify their importance in the choice of Stellenbosch as location for knowledge-based service industries. Participants were required to rate the importance of each factor based on the degree to which it influenced their choice of Stellenbosch as location for their business by indicating a factor as being crucial, beneficial or unimportant. Table 5.1 ranks these factors in order of importance based on their overall average scores. For the most part, the average importance of locational considerations dictating the decision to locate in Stellenbosch does not vary significantly between first, secondary and relocated branches. However, where noteworthy differences between the degrees of influence of specific factors did occur, these are mentioned in the discussion of these factors.

5.2.1 Owner's hometown and quality of life

The most important influencing factor indicated was the occurrence of Stellenbosch as the business owner or key role-player's home town at the time the business was established. Almost half (45.1%) of business establishments indicated this as being of crucial importance in their choice of Stellenbosch as location and a further 40.2% considered it to be beneficial. On average, primary branches for whom Stellenbosch was their first physical location rated this factor as of greater importance than did secondary branches and establishments which had relocated to Stellenbosch from elsewhere. Similarly single branches considered this factor to be more influential than do national and international branches and head offices (Appendix E.1). Though

Table 5.1 Factors influencing business location

RANK	AVERAGE ²²	FACTOR	CRUCIAL	BENEFICIAL	NOT IMPORTANT
1	1.7	Stellenbosch is/was the owner/key role-player's hometown	45.1%	40.2%	14.7%
2	2.14	Stellenbosch has beautiful natural surroundings	14.6%	57.3%	28.2%
3	2.15	Stellenbosch provides a better quality of life for employees	15.5%	54.4%	30.1%
4	2.16	Stellenbosch is a location that attracts highly educated/specialist employees	16.5%	51.5%	32%
4	2.16	Stellenbosch provides good primary/secondary/tertiary education opportunities for employees' children	18.6 %	47.1%	34.3%
5	2.19	Stellenbosch is the closest location to your most important clients/customers	23.5 %	34.3%	42.2%
6	2.21	Stellenbosch is the closest location to the majority of your clients/customers	20.8 %	37.6%	41.6%
6	2.21	Stellenbosch is closely situated to Cape Town	10.8%	57.8%	31.4%
7	2.22	Stellenbosch is a good location for finding highly-skilled university graduates	18.6%	41.2%	40.2%
8	2.25	Stellenbosch has an excellent pool of highly educated specialists in your line of business	15.7%	43.1%	41.2%
8	2.25	Stellenbosch is safer than other areas in terms of crime	12.7%	50%	37.3%
9	2.26	Your business is closely situated to useful business networks	7.8%	58.3%	34%
10	2.28	Your business is situated at a prestigious address / office park	16%	40%	44%
11	2.29	Stellenbosch has a good mix of social and cultural amenities	9.8%	51%	39.2%
12	2.31	Stellenbosch has an attractive/suitable climate	9.8%	49%	41.2%
13	2.36	Your business is closely situated to tertiary institutions (excl. the university)	12.6%	38.8%	48.5%
14	2.42	Stellenbosch is a university town	11.7%	35%	53.4%
14	2.42	Stellenbosch is closely situated to convenient transport links	10.8%	36.3%	52.9%
15	2.58	Stellenbosch provides good public services	5%	31.7%	63.4%
16	2.6	Your business is closely situated to Research and Development institutions (e.g. CSIR)	7.8%	24.3%	68%
16	2.6	Your business is closely situated to similar firms in the same industry (competitors)	4.9%	30.1%	65%
17	2.65	Stellenbosch allows certain other financial benefits	5.8%	23.3%	70.9%
18	2.67	Your business is closely situated to useful government resources	1%	31.4%	67.6%
19	2.81	Stellenbosch allows rent benefits	1%	16.7%	82.4%
20	2.88	Stellenbosch allows tax benefits	1%	9.9%	89.1%

Bold figures are referred to in discussion

²² 1=crucial 2=beneficial 3=not important

participants were specifically requested to rate factors in terms of their influence on business location decisions as opposed to personal preferences, the relationship between factors reflecting personal choice in terms of an owner's place of residence and factors influencing business location decisions are not always easily distinguishable, particularly in the case of smaller and single branch establishments. It is interesting to note in this regard that four other factors ranking among the top ten reasons for locating a business in Stellenbosch are related to the quality of life associated with the town. These include beautiful natural surroundings, a better quality of life for employees, availability of good primary and secondary education for the children of employees, and safety in terms of relatively low crime rates. In this regards the Stellenbosch case study thus strongly supports the research constituency who ascribe the growth of service industries in towns to factors pertaining to quality of life (Beyer & Lindahl 1996; Castells 1991; Coffey and Shearmur 1997; Daniels & Bryson 2003; Rogerson 2002).

5.2.2 Proximity to clients

Service sector literature places great emphasis on the debate between proponents of the theory that IT-dependent service-based industries have become footloose in nature, and the opposing research constituency who believe that this sector is still subservient to a dependency on face-to-face consultation, resulting in industries continuing to locate close to markets and clients. Supporting the latter's claim, the majority of participants (58%) in the Stellenbosch case study have indicated face-to-face consultation to be crucial to the success of their core business activities (Chapter Four, Table 4.4). This is seemingly emphasised in their locational decision-making with proximity to the most important business clients being rated as crucial by almost a quarter (23.5%) of participants, and proximity to the majority of clients rated crucial by 20.8%, making them the 2nd and 3rd most highly rated crucial factors. These two considerations also ranked 5th and 6th respectively in their overall importance. However, as previously mentioned, the relationship between proximity to clients and the importance of face-to-face client consultation, though related, is ambiguous (Chapter Four, section 4.1.4). This is illustrated by statistics which show that only 28.1% of businesses that rated face-to-face consultation as being crucial to the success of their businesses rated proximity to the majority of clients as a crucial consideration in their decision to locate in Stellenbosch. Furthermore, only 31% of establishments who greatly depend on face-to-face consultation rated proximity to their most

important clients as crucial in their locational considerations. It can thus be deduced that, although the majority of Stellenbosch participants consider themselves dependent on face-to-face consultation to ensure the successful operation of their business (Chapter Four, Table 4.4), the locational patterns of the majority of these establishments have not exclusively been dictated by proximity to clients. It is interesting to note though that both client-related factors were rated as of greater importance by secondary branches and relocated establishments than by establishments for which Stellenbosch was their first choice of location, suggesting that many companies establish secondary branches or relocate their businesses to Stellenbosch to be closer to their client base (Appendix E.2). These companies however, constitute only 27% of participants (Figure 5.1).

In general, factors pertaining to client proximity were given higher overall importance ratings by national and international branches than by head offices (Appendix E.1). A possible explanation for this trend could be that branches are usually established close to specific clusters of clients whereas the main focus of head offices are more often the fulfilment of the enterprise's general administrative functions as opposed to primarily offering services to clients. On average, proximity to the majority of clients was rated the single most important factor by national branches. In addition to this factor, international branches also indicated proximity to their most important clients as well as useful business networks as being the most importance considerations in locational decision-making (Appendix E.1). Table 5.2 supports this explanation, indicating the majority of client bases of national and international branches to be either in Stellenbosch (23.3% and 30%) or the immediate surrounding area (36.2% and 24%). On the contrary, just over half (51.8%) of the clientele of national head offices is situated in other provinces and 65.4% of international head offices' client base in other countries. Predictably, the majority of clients of branches with a single operational office in Stellenbosch are located within Stellenbosch itself (41.4%).

Table 5.2 Geographic distribution of client base per branch type

BUSINESS BRANCH TYPES	AVERAGE % OF CLIENTS AT DIFFERENT LOCATIONS				
	STELLENBOSCH	SURROUNDING SMALL TOWNS	CAPE TOWN	OTHER PROVINCES	OTHER COUNTRIES
SINGLE BRANCHES	41.4%	18.7%	15.6%	18.2%	5.9%
NATIONAL BRANCH	23.3%	36.2%	16.8%	17.6%	3.5%
NATIONAL HEAD OFFICE	12%	17%	16.8%	51.8%	3%
INTERNATIONAL BRANCH	30%	24%	5%	1.2%	39.8%
INTERNATIONAL HEAD OFFICE	7.8%	6.5%	8.9%	11.5%	65.4%

Bold figures are referred to in discussion

5.2.3 Availability of highly skilled employees

Within the new knowledge economy the importance of natural resources and manual labour has taken a backseat in preference of intellectual capital and the highly-skilled workforce necessary to ensure competitiveness (Anselin *et al.* 2000; Asián 2003; Florida 1999; Harloe & Perry 2004; Lawton Smith & De Bernardy 2000). As such, another critical consideration pertaining to the choice of business location involves the availability of a highly-skilled work force. Once again this important requirement of Stellenbosch service establishments supports overall findings reflected in the service industry literature which stresses the strong dependence of knowledge-based industries on a skilled labour force, the presence of which can act as catalyst for the location and growth of regional clusters of firms (Bryson, Daniels & Warf 2004; Castells 1991; Florida 2005; Iammarino & McCann 2006; Marshall *et al.* 1988; Keeble & Nachum 2002; Marshall, *et al.* 1988; Rogerson 2001).

Amongst the ten most important factors in considering Stellenbosch as business location, three are related to the availability of a highly-skilled work force. Firstly, ranked overall as the fourth most influential factor (Table 5.1), Stellenbosch is considered to be a highly suitable location for attracting specialist employees. Once again it is noteworthy that this requirement is closely related to the desired quality of life often associated with certain smaller towns. The responses of Stellenbosch service establishments confirm that Stellenbosch possess many of the specific environmental pull-factors required to attract highly-skilled employees. Examples include beautiful natural surroundings, good quality of life, cultural amenities, an innovative environment and availability of good educational institutions. Of all participating businesses

16.5% found the town's potential to attract employees a crucial consideration in their choice of business location. This case study thus confirms Florida's (2005) Creative Capital theory which emphasizes the tendency of highly educated individuals such as scientists, engineers, university professors, designers, architects, researchers, analysts, high-tech, financial, legal, and business management professionals to locate in environments which comply with their personal preferences. This trend places pressure on regions to produce the environments and infrastructure necessary to attract and keep these individuals. Rogerson (2002) is similarly convinced that such desirable locations are crucial in determining the spatial distribution of the information service sector (Rogerson 2002). Klaus (2004: 5) most accurately summarized this tendency when he wrote: "[T]he central question...is not anymore where...enterprises settle but where...qualified and highly qualified labour settle".

A second labour-related consideration deemed important by case study participants is the direct availability of highly-skilled university graduates. This factor, ranking seventh in overall importance, was regarded as a crucial concern by 18.6% of establishments when considering Stellenbosch as potential location for their businesses. Further linkages between the university and knowledge-based industries and the significance of these connections will be discussed in Chapter Six. Thirdly, as the eighth most important factor influencing locational decision-making, Stellenbosch has an excellent existing pool of highly educated specialists which encouraged many businesses to settle in the town. Taking into account the significant influence of labour on the service industry's geographic distribution it is noteworthy that Stellenbosch is considered to be both a good location in terms of its existing labour force as well as a town with many of the pull factors required to attract highly skilled employees from other areas.

International branches and international head offices in particular, rated both the existing pool of educated specialists and Stellenbosch's potential to draw new employees as two of the most important considerations in their decision to locate in the town (Appendix E.1). In addition, in comparison with other branch types, international head offices gave the highest rating to the high quality of life offered to employees by the town whereas international branches considered the relative safety of Stellenbosch in terms of crime, as particularly important. This is understandable when considering that the half (50%) of the head offices of secondary branches

are situated in Pretoria and Johannesburg which are renowned for its high crime rates (Figure 5.2).

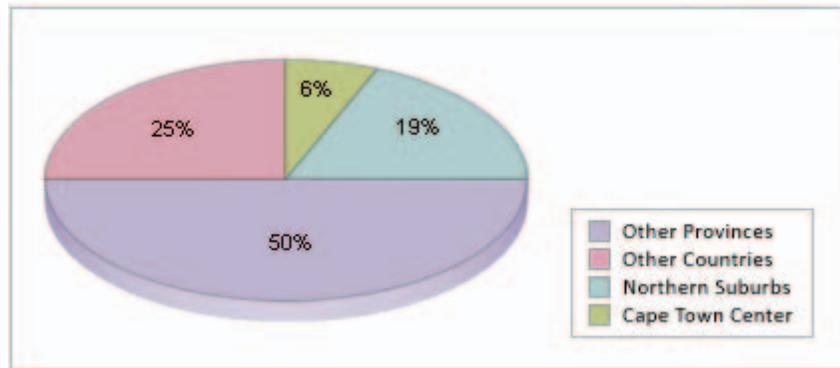


Figure 5.2 Locational distribution of the head offices of secondary branch participants

The literature leaves little room for argument when it comes to the dependence of the knowledge-based service industry on highly educated individuals who are seen as the driving force of innovation and new knowledge creation. The following discussion provides a more detailed description of the knowledge-driven labour force in Stellenbosch.

5.2.3.1 The size of the Stellenbosch labour force

Table 5.3 summarises the average number of full- and part-time employees grouped according to business activity categories. *Accounting* firms employ the highest average of approximately 34 full-time employees along with a high average of almost 6 part-time employees. This could be explained by the fact that large accounting firms require many clerical auditing staff members, often consisting of a high turnover of recent graduates completing their articles. However, two of the cases in this category had unusually large labour forces of 120 and 110 employees respectively and as such the average of about 34 employees is not necessarily representative of the category as a whole. Similarly the *Insurance and Pension Funding* category shows a skew

Table 5.3 Average number of full- and part-time employees per business activity category

BUSINESS ACTIVITY CATEGORY (IN DESCENDING ORDER OF AVERAGE NUMBER OF FULL-TIME EMPLOYEES)	AVERAGE NUMBER OF FULL-TIME EMPLOYEES				AVERAGE NR. OF PART-TIME EMPLOYEES	AVERAGE NR. OF MALE EMPLOYEES	AVERAGE NR. OF FEMALE EMPLOYEES
	Mean	Median	Min	Max			
OTHER BUSINESS ACTIVITY: <i>ACCOUNTING</i>	33.5 ²³	7	2	120	5.6	14.5	18.1
OTHER BUSINESS ACTIVITY: <i>TECHNOLOGICAL & INDUSTRIAL</i>	28.3 ²⁴	15.5	5	77	8.8	15.8	7.8
INSURANCE & PENSION FUNDING	27.3 ²⁵	9	6	85	2.8	6	12.3
COMPUTER AND RELATED ACTIVITIES	19.1 ²⁶	10.5	7	60	1.6	13.5	4.7
OTHER BUSINESS ACTIVITY: <i>ENVIRONMENTAL MANAGEMENT</i>	15.5	9.5	1	40	1.2	3.6	4.4
OTHER BUSINESS ACTIVITY: <i>MARKETING</i>	10.7	12	2	18	1	5.7	6
FINANCIAL INTERMEDIATION & AUXILIARY ACTIVITIES	10.7	5	1	44	0.2	4.7	5.9
OTHER BUSINESS ACTIVITY: <i>CREATIVE INDUSTRIES</i>	10.1	9	1	33	0.4	3.4	6.4
OTHER BUSINESS ACTIVITY: <i>BUSINESS CONSULTANTS</i>	8.2	6	1	28	0.9	4.3	4.7
REAL ESTATE ACTIVITIES	7.7	4	2	25	1	3.3	3.4
OTHER BUSINESS ACTIVITY: <i>ENGINEERS</i>	7.8	5	3	22	0.8	6.4	2
OTHER BUSINESS ACTIVITY: <i>ARCHITECTURAL</i>	4.4	3	1	19	0.9	2.3	2.2
OTHER BUSINESS ACTIVITY: <i>LEGAL</i>	3.6	2	1	10	0.7	2	1.6
OTHER BUSINESS ACTIVITY: <i>ADMINISTRATIVE ACTIVITIES</i>	3.5	3.5	2	5	0	-	2.5
RESEARCH & EXPERIMENTAL DEVELOPMENT ²⁷	-	-	-	-	-	-	-

Bold figures are referred to in discussion

²³ Mean when Max value is removed = 21.14

²⁴ Mean when Max value is removed = 21.29

²⁵ Mean when Max value is removed = 8

²⁶ Mean when Max value is removed = 16.4

²⁷ Data not provided

distribution based on an extreme outlier of 85 making an average of almost 27 full-time employees for this category improbable. More significant in this regard would be the average 28 full-time employees within the *Technological Development* field and an estimated 19 within the *Computer and Related Activities* category. These categories also show amongst the highest numbers of average part-time employees (8.75 and 1.6 respectively). The fact that these two categories consist of high-technology industries is noteworthy, supporting researchers who regard the spatial dispersal of a highly educated workforce as the most significant determinant of the location of high-tech knowledge-based industries (Rogerson 2002).

It is also interesting to note trends pertaining to gender differences within different business activity categories (Table 5.3). Overall higher averages of female employees are prevalent within all finance-related industries including *Accounting* (18.1), *Insurance and Pension Funding* (12.3) and activities related to *Financial Intermediation* (5.9). There is also a strong majority of female employees within *Creative Industries* (6.4). On the contrary, the average number of male employees significantly outweighs female averages within *Technological Development* (15.8), *Computer and Related Activities* (13.5) and *Engineering* establishments (6.4). The Stellenbosch statistics thus indicate that most IT-related fields remain traditionally male-dominant within the Stellenbosch context whereas financial industries show a stronger female presence. Figure 5.3 gives a visual representation of the average size and gender distribution of the Stellenbosch knowledge-based service sector labour force.

5.2.3.2 Labour force expansion as a measure of growth

According to service industry literature, growth in employment opportunities is often used as a measure of development in the New Economy (Bailly 1995; Coffey & Polèse 1989; Marshall *et al.* 1988). The average annual percentage growth in employment was measured for each respective category by comparing the average number of individuals employed at the time branches were first established with the current number of full-time employees, taking into consideration the average time business establishments in each category have been operational in Stellenbosch. Apart from administration-based activities, all categories showed a rather substantial employment growth rate emphasizing the contribution of knowledge-based industries to the economic development of Stellenbosch and confirming the continuous development of



Figure 5.3 Average size and gender distribution of the labour force of knowledge-based service industries in Stellenbosch

industries synonymous with the new knowledge economy. The most significant growth was identified within *Computer and Related Industries* which show the highest average annual employment growth rate of 182.2% (Table 5.4). In addition, this category also promises the highest rate of future employment growth with projections indicating an average of three new individuals to be appointed within the following year, surpassed only by the *Technological Development* category within which an average of approximately five (4.9) new employees will be employed. These trends emphasize the strong presence of high-tech service industries in Stellenbosch supporting Rogerson’s (2001) prediction that the geographical agglomeration of related knowledge-based activities in ‘smart regions’ could potentially drive a region’s economic development.

Accounting establishments as well as *Insurance and Pension Funding* businesses also show high employment growth rates, but it is important to keep in mind the former category's skewed distribution in terms of company size and the occurrence of an outlier in the latter's case as previously mentioned. In line with the international trend towards vertical disintegration and the subsequent outsourcing of business activities there is also substantial employment growth within *Business Consultancy* activities (97.2%). Consultancy establishments in Stellenbosch are diverse in nature ranging from environmental, security, wine and agriculture, immigration and to a greater extent Geographic Information Systems (GIS) and business development consultants. Similarly, *Creative Industries* which include photographers, web and graphic design agencies, advertisers, publishing and translation services also show a significant annual employment growth of 87.3%. Though numbers vary, the majority of businesses in all categories indicated that they will be appointing new employees within the next year (2008-2009). No businesses had any intention to downsize their labour force within the immediate future.

5.2.3.3 Profiling the average Stellenbosch knowledge-worker

The average Stellenbosch knowledge-worker falls within the 26-35 age bracket (37.3%). Though not the only applicable categories, this trend is most sharply defined within the *Technological Development, Computer and Related Activities* and *Creative Industries* fields. In general however, the average age of employees varies quite substantially between business activity categories. Almost a quarter (23.8%) of the combined work force of all participating establishments are younger than 25. This is particularly prevalent within *Accounting* and *Financial Intermediation* establishments where this young average age could be explained by the reliance of these industries on a large clerical staff usually consisting of recent graduates. Conversely, the majority of employees within the *Insurance and Pension Funding, Legal, Business Consultancy* and *Engineering* categories are between the ages of 36 and 50. This trend is possibly due to the nature of these activities demonstrating a strong dependence on experience and specialised skills which are usually more established amongst slightly older individuals. In general, this age group is more prevalent than the youngest category, with a total of 29.7% of all Stellenbosch knowledge workers falling into the 36 to 50 age bracket. A relatively low 9.1% of employees are over the age of 50. Stellenbosch thus accommodates a relatively young work force within its knowledge-based service sector.

Table 5.4 Average annual employment growth per business activity category

BUSINESS ACTIVITY CATEGORY (IN DESCENDING ORDER OF AVERAGE ANNUAL EMPLOYMENT GROWTH)	AVERAGE NR. OF EMPLOYEES AT TIME OF BRANCH ESTABLISHMENT	AVERAGE NR. OF CURRENT FULL-TIME EMPLOYEES	AVERAGE NR. OF YEARS OPERATIONAL IN STELLENBOSCH	PERCENTAGE EMPLOYMENT GROWTH PER YEAR	AVERAGE NR. OF INDIVIDUALS TO BE EMPLOYED WITHIN THE NEXT YEAR
COMPUTER AND RELATED ACTIVITIES	2.4	19.1	3.8	182.2%	3
OTHER BUSINESS ACTIVITY: <i>ACCOUNTING</i>	4.5	33.5	4.3	151.6%	1.4
INSURANCE & PENSION FUNDING	5.5	27.3	4	98.9%	1.3
OTHER BUSINESS ACTIVITY: <i>BUSINESS CONSULTANTS</i>	2.2	8.2	2.8	97.2%	1.1
OTHER BUSINESS ACTIVITY: <i>CREATIVE INDUSTRIES</i>	2.7	10.1	3.1	87.3%	1.6
OTHER BUSINESS ACTIVITY: <i>ENVIRONMENTAL MANAGEMENT</i>	3.5	15.5	4.3	79.2%	1.3
REAL ESTATE ACTIVITIES	2	7.7	3.7	77.3%	2.6
FINANCIAL INTERMEDIATION & AUXILIARY ACTIVITIES	4.4	10.6	3.4	41.8%	1.6
OTHER BUSINESS ACTIVITY: <i>TECHNOLOGICAL & INDUSTRIAL</i>	11.4	28.3	3.8	39.5%	4.9
OTHER BUSINESS ACTIVITY: <i>ENGINEERS</i>	3.3	7.8	3.8	36.9%	0.9
OTHER BUSINESS ACTIVITY: <i>LEGAL</i>	1.6	3.6	3.6	35.7%	0.7
OTHER BUSINESS ACTIVITY: <i>ARCHITECTURAL</i>	2.1	4.4	3.8	29.2%	0.8
OTHER BUSINESS ACTIVITY: <i>MARKETING</i>	6.3	10.7	4	17.1%	0.3
OTHER BUSINESS ACTIVITY: <i>ADMINISTRATIVE ACTIVITIES</i>	4	3.5	2	6.3%	2.5
RESEARCH & EXPERIMENTAL DEVELOPMENT ²⁸	-	-	4.5	-	-

Bold figures are referred to in discussion

Combined data from participating establishments indicates that the vast majority (79.9%) of the Stellenbosch knowledge-based service industry's labour force are educated up to a tertiary level. Of this total, 59.3% has a university qualification with 32.3% of these individuals in possession of postgraduate degrees²⁹. Of all University graduates employed in Stellenbosch-based service industries, a majority of 61.3% of these employees obtained their most recent degree from Stellenbosch University. This finding supports the ratings given by a large percentage of

²⁸ Data not provided

²⁹ Honours, Masters and/or Doctoral degrees

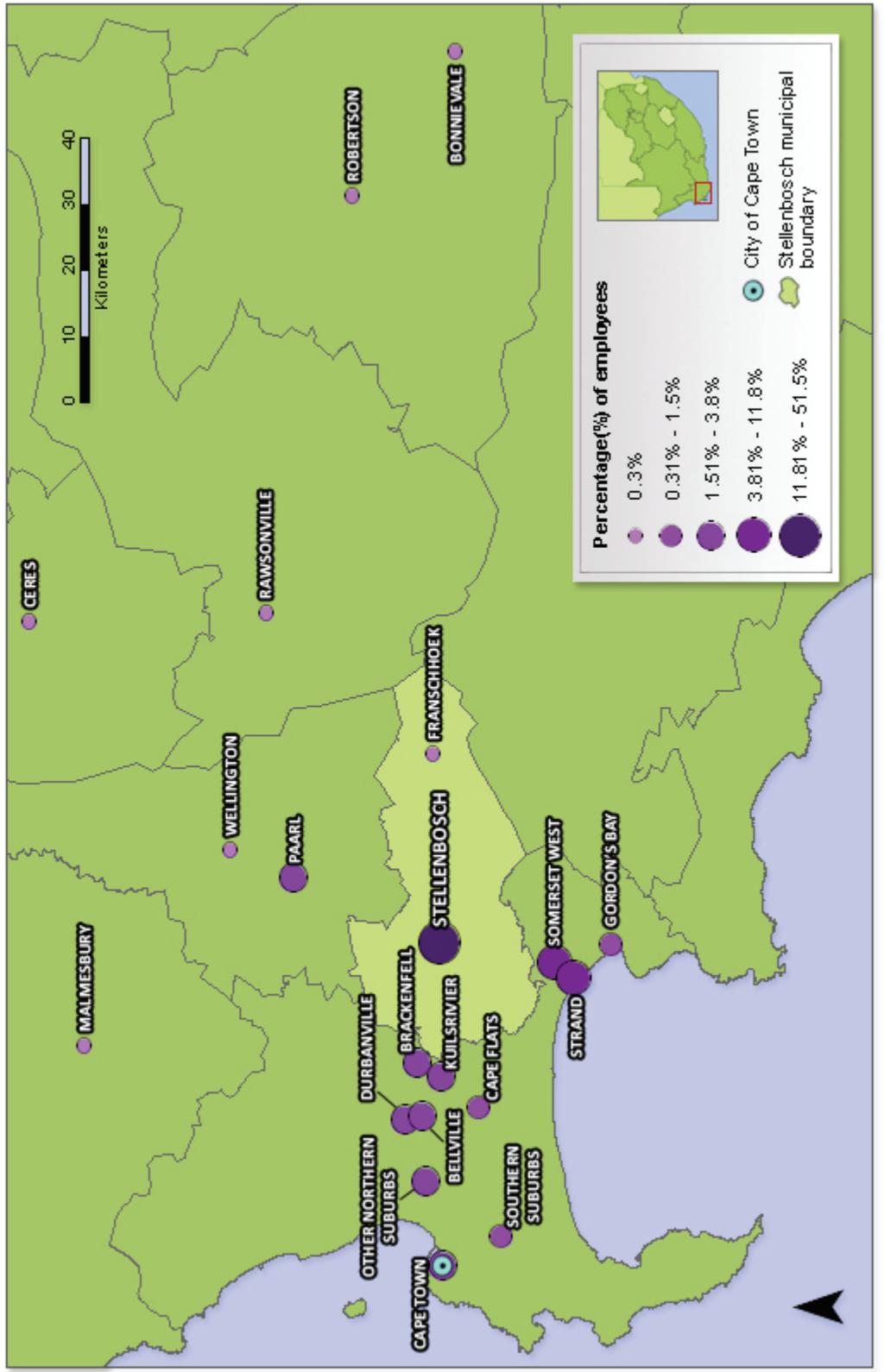
establishments who indicated a preference towards Stellenbosch as business location based on the availability of highly-qualified graduates in the town (Table 5.1).

Employee data furthermore indicates that 18.3% of knowledge-workers within the Stellenbosch service industry have worked at their current establishment for less than a year. Although this indicates a relatively high percentage of new appointments within the industry it is unknown whether these appointments were additional to existing job positions or replacements of former employees and cannot necessarily serve as an indication of employment growth within this sector. The majority (40.8%) of employees have been employed at their current place of work between one and three years and just over a quarter (26.8%) between four and eight years. These statistics could be a manifestation of the flexibility associated with the new global economy with its fast-moving advances in technology and dependence on innovation which have resulted in a work force characterised by frequent career and job changes. In Stellenbosch, only 9.4% of employees have been employed for nine to fourteen years and the minority (4.7%) for over 15 years. When keeping in mind that the average worker falls between the ages of 20 and 35 it is not surprising that the average length of employment should be relatively short.

5.2.3.4 Geographic distribution of Stellenbosch knowledge-worker residences

Residential information of the labour forces of participating establishments was gathered to explore the geographic dispersal of Stellenbosch-based employees. Just over half (51.5%) of individuals working in Stellenbosch also reside in or directly outside of the town. The hamlets of Jamestown, Pniel, Kylemore and Kayamandi informal settlement, all within a 15km radius of the built-up area of Stellenbosch, were included under the Stellenbosch category (Table 5.5). A further 11.8% and 8.4% of employees live in the surrounding towns of Somerset-West and the Strand, which are situated approximately 15-20km south of Stellenbosch. Toward the east and north-east beyond the town, between 3.8% and 3.1% of employees live in the suburbs of Brackenfell, Kuilsriver, Durbanville and Bellville. Apart from the constituency residing in Stellenbosch itself, most other employees live in surrounding towns most likely to allow an easier commute. Figure 5.4 gives a visual representation of the location of the towns and suburbs where Stellenbosch-based knowledge workers reside.

SPATIAL DISTRIBUTION OF RESIDENTIAL TOWNS OF THE STELLENBOSCH SERVICE SECTOR'S LABOUR-FORCE



Source: Adapted from Stellenbosch Municipality Integrated Development Plan, May 2007

Figure 5.4 Geographic locations of residential towns of the Stellenbosch-based service sector labour force

Table 5.5 Geographic dispersal of the Stellenbosch labour force

TOWN OF RESIDENCE	WITHIN 25KM RADIUS	LINKED TO STELLENBOSCH BY A DIRECT ROAD	PERCENTAGE OF EMPLOYEES
STELLENBOSCH (INCL. JAMESTOWN, PNIEL, KYLEMORE, KAYAMANDI)	✓		51.5%
SOMERSET-WEST	✓	✓	11.8%
STRAND	✓	✓	8.4%
BRACKENFELL	✓		3.8%
KUILSRIVER	✓	✓	3.6%
DURBANVILLE	✓		3.6%
BELLVILLE			3.1%
NORTHERN SUBURBS (INCL. BLOUBERG, KRAAIFONTEIN, TABLE VIEW, GOODWOOD, MELKBOSSTRAND, PARKLANDS, PAROW, PLATTEKLOOF)			2.7%
CAPE TOWN CENTER			2.7%
PAARL	✓		2.6%
OTHER TOWNS IN WESTERN CAPE (INCL. CERES, MALMESBURY, RAWSONVILLE, WELLINGTON, ROBERTSON, BONNIEVALE)		VARIES	2%
CAPE FLATS (INCL. EERSTERIVIER, ELSIESRIVIER, KAYELITCHA, LANSDOWNE, MITCHELL'S PLEIN, DELFT, BLUE DOWNS, BLACKHEATH, MACASSAR)		VARIES	1.5%
GORDON'S BAY	✓	✓	1.1%
SOUTHERN SUBURBS (INCL. CLAREMONT, KALK BAY, FISHHOEK, PINELANDS, HOUT BAY, WYNBERG)			0.9%
FRANSCHHOEK	✓	✓	0.3%
OTHER PROVINCES			0.3%

Bold figures are referred to in discussion

5.2.4 Useful business networks

It is important to distinguish between competitive firms within the same industry and useful business networks that allow inter-firm collaboration. Whilst the former specifically refer to businesses within the same line of business providing the same types of services, the latter signifies related firms, possibly but not necessarily within the same industry, where interaction between firms allow for the development of mutually beneficial networks. Ranking within the top ten most influential factors with the majority (58.3%) of participants viewing inter-firm business networks as a beneficial, the importance of this consideration when choosing a business location cannot be ignored. It is particularly interesting that international branch offices in particular, indicated useful business networks along with proximity to clients, as one of the most influential concerns in their decision to locate in Stellenbosch (Appendix E.1). The importance of proximity to competitors is discussed in section 5.2.6.

5.2.5 Prestigious address

The final factor rating amongst the top ten is the importance of a prestigious Stellenbosch address or office park in determining business location. Fifty-six percent of participants deemed this consideration to be to be beneficial at the very least. In addition to data provided in questionnaires, the Average Nearest Neighbour analysis tool in ESRI's ArcMap software was used to calculate the degree of spatial clustering between those 16% of respondents who indicated a prestigious address to have been crucial in their decision to situate in Stellenbosch. The goal in this instance was to identify whether specific areas or office parks in Stellenbosch can be directly linked to perceptions of prestigious location. The Average Nearest Neighbour tool measures the distance between the centre point of a feature (business) and the centre point of its nearest neighbour to establish whether the features (in this case the establishments that rated prestigious address as crucial) are spatially clustered together or geographically dispersed. The distances³⁰ of all nearest neighbours are averaged and assigned an index rating based on the comparison of this calculated mean distance with an expected mean distance derived from a hypothetical random distribution. An index of less than 1 signifies a clustered pattern whereas a value greater than 1 indicates dispersion of features (businesses).

Figure 5.5 shows the geographic location of the most well-known and largest office parks in Stellenbosch, namely Brandwacht Office Park, Blaauwklip Office Park, Oewerpark, Millennia Park, and Technopark. The map also identifies the participants who regarded prestigious address to have been a crucial factor in their locational decision-making process. The results of the Average Nearest Neighbour Analysis indicate that these establishments are clustered together in certain geographical areas within Stellenbosch, specifically the historic part of Stellenbosch's central business district (CBD) and Technopark. The oldest and most prestigious part of Stellenbosch centres on Dorp and Church streets which captures the essence of the town's historic sense of place. Technopark, in turn, is strongly related to high technology service industries, a remnant of the park's initial purpose to house university-related spinoffs and commercialised university-driven research initiatives.

³⁰ Distances were calculated using Euclidian Distance– the straight-line distance between the two neighboring features (as the crow flies).

GEOGRAPHICAL CLUSTERING AND DISPERSION OF SELECTED STELLENBOSCH ESTABLISHMENTS BASED ON AVERAGE NEAREST NEIGHBOUR ANALYSIS

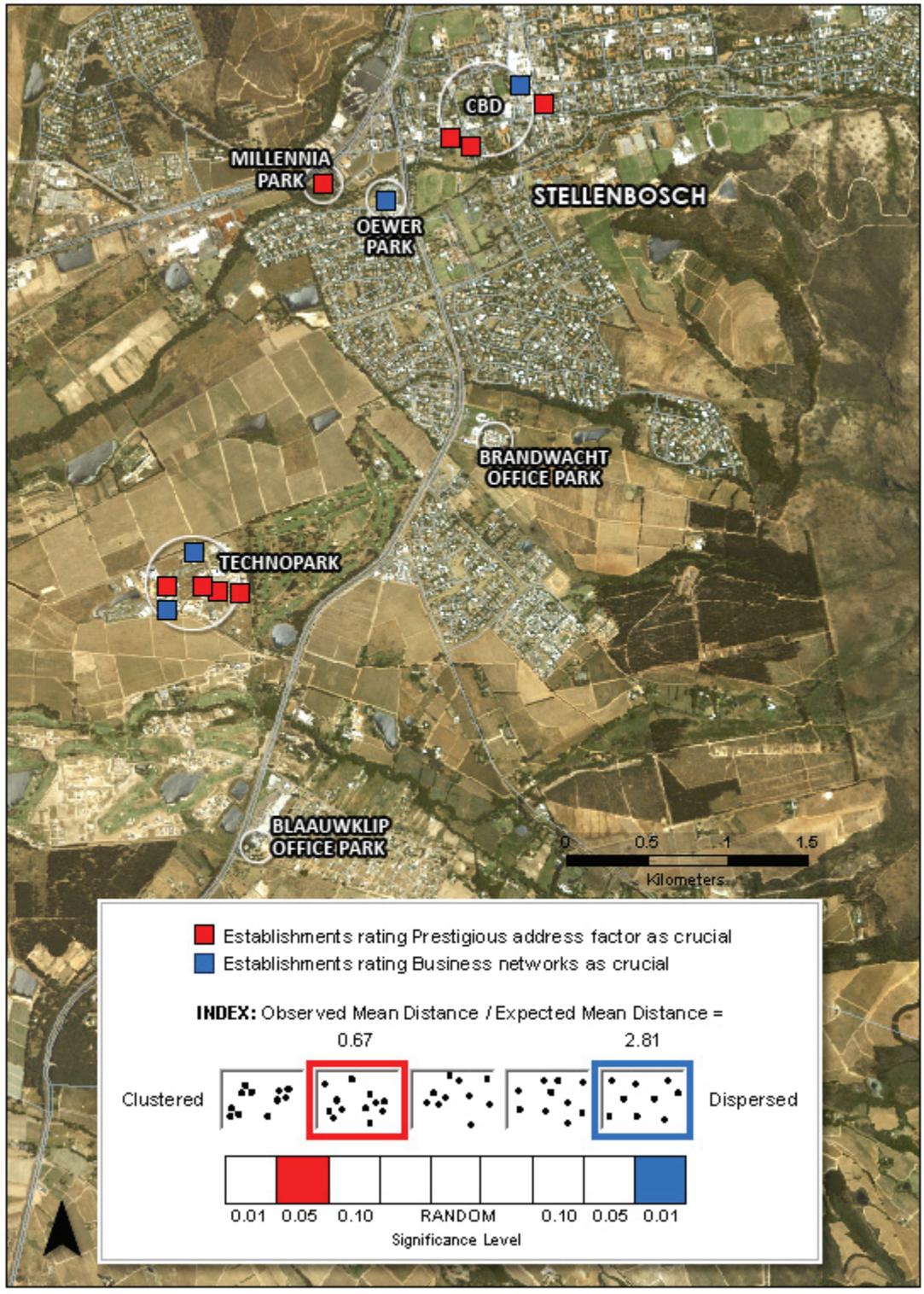


Figure 5.5 Nearest neighbour analysis indicating the clustering and dispersal of selected study participants

Castells and Hall (in Borja & Castells 1997) emphasize the phenomenon of geographically concentrated technology-driven industries in innovative milieu referred to as ‘technopoles’, which often take the form of science parks and have a strong connection with research institutions. Although Technopark has since its inception become the location of a variety of industry types, the majority of which have no direct link to SU, many of the establishments still fall within the knowledge-based service sector with numerous *Computer and Related Activities* industries, *Technological Development* and *Engineering* consultancies still collaborating with SU to varying extents. Industries situated in Technopark still enjoy the main benefits of proximity to a university, namely access to new technological knowledge as well as a steady supply of student workers and highly specialised graduates to supplement the local labour force (Lawton Smith & De Bernardy 2000; Borja & Castells 1997; Rogerson 2002). Establishments across various business activity categories commented on the high status associated with an office in Technopark where the prevalence of professional industries associated with high technology, innovation and professionalism allows for inter-firm collaboration, networking opportunities and attracting new clients.

In addition to indicating the geographical location of business clusters in Technopark and the Stellenbosch CBD, Figure 5.5 also shows a calculated significance level of 0.05 which denotes that there is less than a 5% likelihood that the clustered pattern of establishments rating prestigious address as crucial, is the result of random chance. It can therefore be inferred that Technopark and the Stellenbosch CBD are perceived as prestigious locations within the town leading to the spatial concentration of business establishments who value the status associated with these specific street or office locations.

To illustrate a dispersed pattern, Figure 5.5 also shows the location of those respondents who indicated useful business networks to have been crucial in their decision to situate in Stellenbosch. The Average Nearest Neighbour results indicate these establishments to be spatially dispersed with less than 1% likelihood that this dispersed pattern could be the result of random chance. Although business networks are not necessarily physical in nature, the service sector literature has argued that geographical clustering of firms within related industries often occur based on the externalities experienced by locating close to business networks that allow

symbiotic working relationships. However, in the Stellenbosch case study, though firms acknowledge the importance of these networks, there is no closer geographical relationship between these establishments other than their location within the same town.

5.2.6 Proximity to competitors

Though proximity to clients play a significant role in the choice of business location, it is interesting to note that a majority of 65% of participants deemed proximity to competitive firms to have been unimportant in their decision to settle at their current Stellenbosch location (Table 5.1). This relates to the 55% majority of businesses who indicated proximity to competitors as not being important to the success of their core business activities (Chapter Four, Table 4.4).

5.2.7 Transport infrastructure

The literature cites convenient transport links and infrastructure as one of the agglomeration economies that contribute to the clustering together of similar firms (Bryson, Daniels & Warf 2004; Warf 1989). Furthermore, the significance of both IT and transport infrastructure is emphasized in discussions surrounding the potential contribution of service activities to the economic development of small towns through the export of these services to other areas (Beyer & Lindahl 1996; Bryson, Daniels & Warf 2004; Coffey & Shearmur 1997; Stabler & Olfert in Coffey 1995). According to data in Table 5.2, on average more than half (51.8%) of the clients of national head offices are situated in other provinces. In the case of international branches and head offices as much as 39.8% and 65.4% of their clientele are located in other countries. Though service establishments are not dependent on physical resources that need to be transported to markets, the already proven dependence on face-to-face consultation do require the availability of convenient transport networks that facilitate travel.

Stellenbosch is conveniently located between the N1 and N2 major highways and has a Metrorail station allowing access to Cape Town. In addition, the town is situated less than 40km from Cape Town International airport and also boasts a small local air field. Though convenient transport infrastructure were outranked by many other factors in the degree to which it contributes to the successful operation of Stellenbosch businesses, 59% of establishments did consider it to be at least necessary (Chapter Four, Table 4.4). However, when considering its impact on business

location decisions, the importance of transport infrastructure ranks relatively low in comparison with other factors. In this regard it is important to remember though, that the majority of study participants were single branches (Chapter Four, Figure 4.4) and that most of the clients of these establishments are situated in Stellenbosch (Table 5.2). The influence of existing transport links on business location decisions was regarded as much more significant amongst international head offices (Appendix E.1) with high percentages of clients in other provinces and abroad (Table 5.2). Proximity to both local and international airports was specifically mentioned as a beneficial aspect of the town's location. It could be argued that the noteworthy role of transport infrastructure in the operation and location decisions of knowledge-based service industries contradict the research constituency who believe the service sector to be footloose based on its independence on natural resources fixed at specific locations. Although it is not the primary concern of Stellenbosch service industries, the importance of convenient transport links cannot be underestimated, specifically in connecting industries with clients.

5.2.8 Government resources, tax and rent benefits

A study by Bailly (1995) which investigated the growth of the service sectors in different countries, indicated that the rate of growth were often strongly influenced by factors such as tax rates, governmental policies, trade and training. In the South African context and within the Western Cape specifically, the 2001 White Paper on *Preparing the Western Cape for the Knowledge Economy of the 21st Century* (WCPG 2001) recognizes the need to nurture the service sector to ensure the region's capability of competing in the global economy. Within the Stellenbosch case study, however, the majority of participants were sceptical about local government's involvement in the growth of the local service sector. High percentages of establishments found tax and rent benefits to be irrelevant factors in any decisions to operate their businesses in Stellenbosch specifically. In effect, many participants commented that to the contrary, these factors often served as constraints. Though rent and tax considerations are only flexible to a certain extent, a majority of 67.7% of businesses also did not perceive there to be any useful government resources or incentives drawing businesses to the town or encouraging their growth. Only 1% of participants considered this factor as crucial in their decision to locate in Stellenbosch.

5.3 THE SIGNIFICANCE OF STELLENBOSCH AS A MEDIUM-SIZED TOWN

The focus of this chapter has predominantly been on the identification of factors that draw knowledge-based service industries to locate their businesses in Stellenbosch. Beyond determining the reasons why businesses choose Stellenbosch as location, a second tenet of such an enquiry could furthermore question the advantages of Stellenbosch above other similar-sized towns within close proximity of Cape Town. Although such a comparison falls beyond the scope of this study, participants were asked whether their location in Stellenbosch was a matter of preference or necessity. Provided sufficient IT is available, would the participating knowledge-based service industries be able to function as effectively in another town as they do in Stellenbosch? A majority of 68.3% of participants answered yes to this question, implying that, in spite of the numerous benefits that influence location choice, most establishments locate in Stellenbosch as a matter of preference rather than necessity. The unique combination of advantages offered by the town, as discussed in the previous section, culminates in an overall attractive environment that draws knowledge-driven service industries.

5.4 CONCLUSION

This chapter's discussion has emphasised several important factors of particular importance in the average Stellenbosch knowledge-based service establishment's consideration of business location. Though light has been shed on the characteristics of the town that make it attractive to this particular economic segment, it is more likely to be unique combinations of a few factors rather than one dominant consideration that influence the locational decision-making process. Some of the advantages of proximity to Stellenbosch University have already been touched upon but the following chapter comprises a more extensive analysis of the different types and the extent of relationships between knowledge-driven service industries and the university.

CHAPTER 6: THE NATURE OF LINKAGES BETWEEN THE KNOWLEDGE-BASED SERVICE SECTOR AND STELLENBOSCH UNIVERSITY

International literature places great emphasis on the service sector's dependence on innovation to remain competitive in the new knowledge economy. The contribution of university research in technological developments and the role of local industry-university linkages in facilitating knowledge transfers have in many instances been linked with subsequent regional economic development (Anselin, Varga & Acs 1997; Florida 1999; Harloe & Perry 2004; Lawton Smith & De Bernardy 2000; Litan, Mitchell & Reedy 2007). In the South African context, the White Paper on *Preparing the Western Cape for the Knowledge Economy of the 21st Century* (WCPG 2001) emphasizes the importance of networking, collaboration, and the sharing of knowledge between businesses and universities as knowledge-producers and drivers of innovation.

6.1 BUSINESS ACTIVITY CATEGORIES AND PROXIMITY TO THE UNIVERSITY

The majority (60.6%) of knowledge-based service establishments in Stellenbosch indicated proximity to Stellenbosch University (SU) to be generally advantageous to the successful operation of their business. Table 6.1 shows that at least 44.4%, and more often the majority of establishments within each business activity category, deem their proximity to SU as beneficial with the only exception being *Administrative* activities (0%). Within the fields of *Research and Experimental Development* and *Accounting*, all participating firms confirmed their location close to the university to be an advantage. It is also the case for a high percentage of establishments within *Creative Industries* (85.7%) the *Technological Development* field (75%), the *Legal* profession (71.4%), *Environmental Management* (66.7%) and *Marketing* (66.7%).

Table 6.1 Advantage of proximity to the University according to business activity categories

BUSINESS ACTIVITY CATEGORY	ADVANTAGEOUS	NOT ADVANTAGEOUS
FINANCIAL INTERMEDIATION & AUXILIARY ACTIVITIES	45.5%	54.5%
INSURANCE & PENSION FUNDING	50%	50%
REAL ESTATE ACTIVITIES	55.6%	44.4%
COMPUTER AND RELATED ACTIVITIES	54.5%	45.5%
RESEARCH & EXPERIMENTAL DEVELOPMENT*	100%	0%
OTHER: <i>LEGAL</i>	71.4%	28.6%
OTHER: <i>ACCOUNTING</i>	100%	0%
OTHER: <i>ARCHITECTURAL</i>	44.4%	55.6%
OTHER: <i>ENGINEERS</i>	50%	50%
OTHER: <i>TECHNOLOGICAL & INDUSTRIAL DESIGN</i>	75%	25%
OTHER: <i>BUSINESS CONSULTANTS</i>	44.4%	55.6%
OTHER: <i>ENVIRONMENTAL MANAGEMENT</i>	66.7%	33.3%
OTHER: <i>MARKETING</i>	66.7%	33.3%
OTHER: <i>CREATIVE INDUSTRIES</i>	85.7%	14.3%
OTHER: <i>ADMINISTRATIVE ACTIVITIES</i>	0%	100%

Bold figures are referred to in discussion

6.2 COLLABORATION BETWEEN KNOWLEDGE-BASED SERVICE INDUSTRIES AND THE UNIVERSITY

To measure the degree to which collaboration transpires between Stellenbosch service establishments and SU, as well as identifying the nature of existing relationships, participants were required to rate 14 activities according to the frequency with which their establishments engage in these operations. Frequency was measured by distinguishing whether participants often, sometimes or never engage in each respective activity which involves a direct or indirect link with SU. Furthermore, the activity's feasibility is largely dependent on the University being in close proximity to the business establishment. Table 6.2 ranks the 14 activities in order of its average importance scores as rated by participants. However, there is not a large degree of variability between these scores and as such it is more meaningful to consider the frequency with which establishments engage in specific activities, the most noteworthy of which will be discussed below.

Table 6.2 Links existing between knowledge-based service industries and Stellenbosch University

RANK	AVERAGE ³¹	FACTOR	OFTEN	SOMETIMES	NEVER
1	2.34	Our business/organisation employs students on a full or part-time basis.	14.4%	37.5%	48.1%
2	2.43	Stellenbosch University is one of our customers/clients.	16.5%	24.3%	59.2%
3	2.58	Stellenbosch University outsources certain activities to our business/organisation.	9.7%	22.3%	68%
4	2.62	Our business/organisation does consultation work for Stellenbosch University.	8.7%	21.2%	70.2%
5	2.63	Our business/organisation is involved in collaborative projects with Stellenbosch University.	7.8%	21.6%	70.6%
5	2.63	Our business/organisation outsources certain activities to Stellenbosch University.	4.8%	26.9%	68.3%
6	2.67	Our business/organisation participates in postgraduate research (e.g. Honours'/ Masters' theses).	5.8%	21.4%	72.8%
7	2.71	Our business/organisation uses Stellenbosch University students/staff for Research and Development purposes.	1.9%	25%	73.1%
8	2.72	Our business/organisation makes use of students to conduct research on our behalf.	3.9%	20.4%	75.7%
9	2.74	Stellenbosch University does consultation work for our business/organisation.	3.8%	18.3%	77.9%
10	2.78	Our business/organisation uses Stellenbosch University facilities for training or other purposes.	0%	22.1%	77.9%
11	2.83	Our business/organisation participates in recruitment/job fairs presented at or organised by Stellenbosch University.	4.9%	7.8%	87.4%
12	2.91	Our business/organisation is a spin-off from a project initiated by Stellenbosch University.	2.9%	2.9%	94.2%
13	2.97	Our business/organisation has bought products patented by Stellenbosch University or one of its staff members.	1%	1%	98.1%

Bold figures are referred to in discussion

6.2.1 Student employment

The most significant relationship between knowledge-based service industries and the University revolves around the tendency of Stellenbosch-based establishments to employ SU students on a full- or part-time basis. The majority of businesses either often (14.4%) or occasionally (37.5%) make use of employees still engaged in either full- or part time studies (Table 6.2). This tendency is present amongst the majority of business categories but is particularly prevalent within *Computer and Related Activities* and *Accounting* firms of which more than a quarter (26.7% and 33.3% respectively) indicated their frequent use of student employees (Table 6.3).

³¹ 1=crucial 2=beneficial 3=not important

Table 6.3 Business activity categories frequently engaging in University collaboration activities

UNIVERSITY COLLABORATION ACTIVITY	FINANCIAL INTERMEDIATION & AUXILIARY ACTIVITIES	INSURANCE & PENSION FUNDING	REAL ESTATE ACTIVITIES	COMPUTER AND RELATED ACTIVITIES	RESEARCH & EXPERIMENTAL DEVELOPMENT ¹	LEGAL	ACCOUNTING	ARCHITECTURAL	ENGINEERING	TECHNOLOGICAL DEVELOPMENT	OTHER: BUSINESS CONSULTANTS	ENVIRONMENTAL MANAGEMENT	MARKETING	CREATIVE INDUSTRIES
Our business/organisation employs students on a full or part-time basis.	6.7%		6.7%	26.7%			33.3%	6.7%		6.7%	6.7%			6.7%
Stellenbosch University is one of our customers/clients.		17.6%	11.8%	11.8%			5.9%		5.9%	11.8%	11.8%			23.5%
Stellenbosch University outsources certain activities to our business/organisation.				20%					10%	10%	20%	10%		30%
Our business/organisation does consultation work for Stellenbosch University.		22.2%		11.1%			11.1%		11.1%	11.1%	22.2%			11.1%
Our business/organisation is involved in collaborative projects with Stellenbosch University.				12.5%	12.5%					25%	25%			25%
Our business/organisation outsources certain activities to Stellenbosch University.	20%			20%						20%	20%		20%	
Our business/organisation participates in postgraduate research (e.g. Honours'/ Masters' theses).				33.3%	16.7%					33.3	16.7			
Our business/organisation uses Stellenbosch University students/staff for Research and Development purposes.				50%						50%				
Our business/organisation makes use of students to conduct research on our behalf.				25%	25%					25%	25%			
Stellenbosch University does consultation work for our business/organisation.				25%						25%		50%		
Our business/organisation uses Stellenbosch University facilities for training or other purposes.	4.3%	4.3%	4.3%	8.7%		13%	17.4%	4.3%	4.3%	8.7%	13%		4.3%	13%
Our business/organisation participates in recruitment/job fairs presented at or organised by Stellenbosch University.	20%			20%			60%							
Our business/organisation is a spin-off from a project initiated by Stellenbosch University.				33.3%						33.3%				33.3%
Our business/organisation has bought products patented by Stellenbosch University or one of its staff members.				100%										

Three quarters (75%) of these *Computer and Related Activities* industries make use of students from the Engineering Faculty whereas 60% of *Accounting* firms predictably indicated employing students from the Faculty of Economics and Management Sciences. As previously mentioned, this trend could be explained by the dependence of *Accounting* firms on a large number of clerks, many of whom still undertake studies whilst completing their articles. It is likely that in reality even higher percentages of students come from these Faculties since not all establishments that indicated using students specified the Faculties or departments from which they were sourced. Supporting the trend of dependence on student and recent graduate employment, *Accounting* and *Financial Intermediation* firms respectively also constitute 60% and 20% of establishments participating in recruitment and job fairs organised by SU. The remaining 20% of participating establishments predictably fall within the *Computer and Related Activities* field.

6.2.2 Stellenbosch University as client

SU as organisation also requires the use of knowledge-based services and as such several establishments engage in business with SU as their client. Approximately 17% of participants are often involved in business activities with University-based departments or individuals and almost a quarter (24.3%) of participants intermittently engages in business with SU (Table 6.2). These services are provided by establishments across a variety of business categories with a slight majority of *Creative Industries* (23.5%) including photographic, graphic design and publishing activities. Table 6.3 also confirms this trend by indicating the frequent outsourcing of activities by the University to Creative industries (30%), as well as *Computer and Related Activities* (20%) and *Business Consultancies* (20%).

6.2.3 Collaborative projects and spin-offs

Researchers often measure university-driven innovation by the frequency of consultation between Faculties and industry, and the development of spin-off or start-up companies resulting from academic research projects initiated by university departments (Litan *et al.* 2007). A few businesses in Stellenbosch indicated often (7.8%) or sometimes (21.6%) being involved in collaborative projects with SU. These linkages occur specifically within *Computer and Related Activities* (12.5%), *Research and Experimental Development* (12.5%)

and to a larger extent the *Technological Development* (25%), *Business Consultancy* (25%) and *Creative Industry* (25%) fields. Related to this matter, is the occurrence of spin-off companies originating as extensions of university-lead projects. Although rated as of low importance on average it is necessary to emphasise that 5.8% of knowledge-based service establishments in Stellenbosch were to some degree the spin-off of a University-initiated project. Table 6.3 specifies two thirds of these businesses to fall within either the *Computer and Related Activities* or *Technological Development* categories. It is noteworthy that these industry categories also have amongst the largest average labour forces (Chapter Five, Table 5.3). All of these establishments furthermore indicated having direct links with the Faculty of Engineering. The only spin-off business falling outside these two categories is a publishing company (*Creative Industry*) whose origin was not directly related to a specific project but rather the result of a general need within the University environment. Although they make up a small percentage of knowledge-based service industries in Stellenbosch, businesses originating as the result of University-lead initiatives have a meaningful impact on the development of the town's service sector by greatly contributing to job creation within technology-related fields.

6.2.4 Outsourcing to Stellenbosch University and the use of University facilities

Service sector literature places emphasis on the vertical disintegration of company structures which have resulted in the outsourcing of many ancillary business activities that were formerly undertaken in-house (Bryson, Daniels & Warf 2004; Coffey 1995). In addition to being a client of many establishments, a university itself is also an important service provider to which local industries often choose to outsource innovation activities on which they are highly dependent (Lawton Smith *et al.* 2001). A total of 31.7% of participants demonstrated that they outsource certain of their business activities to SU (Table 6.2). A fifth of *Computer and Related Activities* establishments and *Business Consultancies* also suggested that they outsource some of their activities to SU (Table 6.3). A further 20% constitutes *Technological Development* establishments, an occurrence which reiterates the significant link between the Stellenbosch IT sector and the University. Finally, 20% of both *Financial Intermediation* and *Marketing* industries also make use of the services provided by University-employed individuals. The relationship between knowledge-based service establishments and SU can be described as symbiotic when considering that both parties benefit from one another's proximity.

A related matter pertains to establishments' use of the University and its facilities for staff training and related purposes. Participants who indicated the frequent use of such facilities or services were relatively evenly distributed amongst the different business categories suggesting that the service sector as a whole benefits from the proximity of SU in terms of the availability of training and facilities.

6.3 THE PREVALENCE OF HIGH-TECH INDUSTRIES

Rogerson (2000) notes the development of technology parks as one strategy to promote specific regions as ideal locations for high-tech industries. He uses Stellenbosch as an example of a location which has successfully attracted both local and international investors through the establishment of a cluster of high-tech industries. Although not exclusive to these groups, those industries categorised within either the *Computer and Related Activities* or the *Technological Development* categories, were considered to be high-tech industries for the purpose of this study due to the unambiguous nature of their core activities' dependence on IT. It is crucial to bear in mind, however, that IT dependence vary greatly even within business activity categories, and numerous participants from other lines of business also exhibited a strong dependence on advanced IT (Chapter Four, Table 4.6). Though Stellenbosch-based high-tech industries are not limited to Technopark, the park houses the largest single cluster of businesses involved in *Computer and Related Activities* (45.5%) as well as the vast majority of establishments within the *Technological Development* sector (87.5%).

The collaborative relationships between IT-related industries and SU deserve special mention. Table 6.3 illustrates the strong connection between the University and *Computer and Related Activities* which is the only business activity category with at least some establishments collaborating with the university on all the included levels. A minimum number of businesses (8.7%) use SU for its training or facilities with a higher percentage of establishments engaging in all the remaining collaborative activities. This trend proves interesting when considering that despite its strong participating presence when compared to other categories, just over half (54.5%) of *Computer and Related Activities* industries generally deemed proximity to SU to be advantageous to the successful operation of their businesses (Table. 6.1) – a relatively low percentage compared to other industries. Closer

investigation confirms that only those establishments (54.5%) that confirmed SU's overall importance (Table 6.1) demonstrated frequent University-partnerships in terms of specific collaborative activities (Table 6.3). Of these establishments two thirds indicated links with the Faculty of Engineering.

Table 6.1 furthermore shows three quarters (75%) of *Technological Development* industries consider their close geographical proximity to SU to be an advantage. Except for participation in job fairs and the purchase of patented products, establishments from this category also have links with the University on all included levels. Fifty percent of the establishments which acknowledged the importance of proximity to SU indicated a degree of affiliation with the Faculty of Engineering. A further 16.7% collaborate with Economic and Management Sciences and a third (33%) have a connection with the Faculty of Science. Also interesting to note is the equal majority share of the *Computer and Related Activities* and *Technological Development* categories in postgraduate research participation and their use of University students and staff for purposes of R&D (Table 6.3).

The most prevalent externalities resulting from relationships between universities and high-tech service industries range from the development of new start-ups or spin-offs as a result of university-driven R&D or collaborative projects, to the development of the highly-skilled human capital on which innovative service industries are dependent (Anselin, Varga & Acs 1997). This case study supports international research by confirming the spill-over of research, innovation and knowledge production that occurs due to proximity between a university and local knowledge-dependent service industries.

6.4 R&D INDUSTRIES AND STELLENBOSCH UNIVERSITY

It is particularly noteworthy to mention the participation of 12.5% of R&D establishments in collaborative projects with SU and 16.7% of industries in postgraduate research (Table 6.3). Furthermore, a quarter (25%) of establishments also indicated making use of students to conduct research on their behalf. These establishments demonstrated links with the Faculties of Science, Agrisciences and Economics and Management Sciences. However, a discrepancy is visible in the lack of industries demonstrating the use of SU students or staff for R&D purposes. It is possible that, despite the questions pertaining to SU, the participating establishment(s) referred to their use of students not associated with SU itself. Another

explanation could however be that the specific establishment(s) make use of SU students but not of any staff members. Whatever the explanation, it is important to keep in mind that only 1.9% of study participants fall within the *Research and Experimental Development* category (Chapter Four, Figure 4.2). In itself, the general lack of participating establishments within this industry is reason to question the strength of relationships between R&D establishments and the University.

6.5 CONCLUSION

The benefits that proximity to a large prestigious R&D institute such as Stellenbosch University affords the local service economy should not be underestimated. Results from the case study confirm the extent of benefits that proximity to an innovative university milieu offers local businesses. The dominant and developing cluster of high-tech computer-related and technological industries in particular, have shown strong ties with specific University Faculties with relationships ranging from collaborative projects that have led to spin-off companies, the employment of students, to the mutual outsourcing of activities. The research literature has confirmed that this type of university-industry collaboration is augmented by geographic and cultural proximity which in many cases lead to the spatial concentration of specific knowledge-based industries (Anselin, Varga & Acs 1997; Iammarino & McCann 2006; Lawton Smith & De Bernardy 2000; Oerlemans & Meeus 2005; Porter 1998; Rogerson 2001; Torre & Rallet 2005). Though not comparable to the scale of international manifestations of this tendency, the Stellenbosch case study still serves as an interesting example of this phenomenon within the South African context.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

The following discussion summarises the research problem and key empirical results whilst considering correlations with research trends and theoretical concepts identified in the literature. The chapter concludes with recommendations for future research on the knowledge-based service sector.

7.1 REVISITING THE RESEARCH PROBLEM

Recommendations from previous research by the Stellenbosch Centre for Geographical Analysis identified Stellenbosch as a leader town possessing a high level of growth potential and suggested a continued in-depth investigation into the development dynamics of the town (Van der Merwe *et al.* 2005). An observed strong presence of knowledge-driven service industries, including national and international head offices, in addition to Rogerson's (2000) identification of Stellenbosch as an innovative milieu with a growing IT service industry, lead to the formulation of the research question: Why do knowledge-based service industries choose to locate in Stellenbosch?

The importance of this question is rooted in several concerns. Firstly, from a spatial perspective, the location of Stellenbosch location within Cape Town's direct sphere of influence places it in the midst of several other leader towns and fast-developing suburbs which compete to benefit from spill-over effects of investment in the metropole. Secondly, the significant growth of the service sector, both on an international level and in South Africa, has placed a strong emphasis on this sector's potential to stimulate national, regional and local economic development. Further research into the knowledge-based service industry is thus of crucial importance, not only if South Africa wishes to play a productive role within the global economy, but also if local towns wish to compete with other small towns and larger metropolitan areas for local and international investment. A third and related consideration regards the perceived footloose nature of service industries. A strong dependence on IT and human capital as opposed to natural resources concentrated within specific geographic locations, has led some to believe that service industries are unrestrained in their choice of business location. Though this notion is strongly contested by certain research constituencies, the potential of the service industry to stimulate development in

peripheral regions, should these establishments in fact be unaffected by locational constraints, calls for further research into the matter. A final factor contributing to the significance of the research question, considers the role that proximity of knowledge-driven service industries to Stellenbosch University play in motivating the decision of these businesses to locate in Stellenbosch. The service sector literature continually emphasizes the crucial role of innovation and knowledge transfers in ensuring the development of the service sector and the impact of proximity to a university as producer of knowledge, R&D and a highly-skilled labour force can therefore not be underestimated.

Despite these significant considerations, relatively little research have been done on the locational dynamics of the service sector in South Africa. The lack of knowledge regarding the motivations behind the decisions of knowledge-driven service establishments to locate in specific urban centres and specifically towns peripheral to major metropolitan areas thus demanded further research.

The following three aims were embedded within the research problem:

- The identification of the nature and extent of the Stellenbosch service sector.
- Establishing which factors motivate knowledge-based service industries to choose Stellenbosch as a business location.
- Determining whether, and, if so, what kind of linkages exist between the knowledge-based services sector and Stellenbosch University as a place of knowledge production, R&D and innovation.

7.2 SYNOPSIS OF RESEARCH RESULTS

The following discussion summarises the main research results pertaining to each of the three research aims.

7.2.1 The nature and extent of the Stellenbosch service sector

The first case study component centred on the compilation of a general knowledge-based business profile for the Stellenbosch service sector. Amongst the different identified business activity categories based on the SIC index, Stellenbosch has service establishments distributed relatively equally amongst all major types of businesses activity categories. However, the majority of knowledge-based service establishments partake either in *Financial*

Intermediation or Computer and Related Activities. This correlates with the recently developed identity of Stellenbosch as centre for IT and R&D related industries as identified by WESGRO (2008) and previous research by Rogerson (2000) highlighting the town as the location of a fast-developing high-tech industry cluster.

A second consideration in profiling businesses concerned the type of branches operating in Stellenbosch. Branch types included single, national and international branches, as well as national and international head offices. Two trends are noteworthy in this regard. Firstly, research results indicate the majority of participating establishments to be single branch businesses with no other operational offices in other towns or cities. Secondly, the significant trend of increasing numbers of head offices support the growing perceived popularity of Stellenbosch as an attractive location for company headquarters. The town boasts a greater prevalence of international head offices than international branches, specifically within the *Computer and Related Activities* category, once again emphasizing the development of a cluster of IT industries in Stellenbosch.

As a third measurable dimension, the average knowledge-based service establishment in Stellenbosch has been in operation between nine and fourteen years. Translated, this means that the majority of businesses were established between the beginning of 1994 and the end of 1999. This could possibly be a result of the newly democratic South Africa's reintroduction into the global economic arena and also a repercussion of significant reductions in company tax as part of overall tax reform measures implemented by the National Treasury during this time period (Manuel 2002). The measurement of the length of time during which service establishments have been operational in Stellenbosch also supports the trend of a consistent increase in international head offices over the past fifteen years, with the majority only having been established within the last one to three years and categorised within the field of *Computer and Related Activities*.

A final inclusion in the business profile assemblage regarded the degree to which specific factors, identified within the literature as being pertinent to the service sector, contribute to the successful performance of establishments' core business activities. In this regard, the majority of businesses indicated a crucial dependence on a highly educated workforce and the requirement of face-to-face consultation with clients. Most study participants also believe the latest IT and R&D to be an important or crucial factor in achieving success with businesses

within the *Technological Development* category being particularly dependent on the latter. The vast majority of businesses apply IT on a regular basis for the purposes of business administration, service provision, research and product development and as much as ninety nine percent of businesses are dependent on IT for communication.

7.2.2 Factors motivating knowledge-based service industries to locate in Stellenbosch

The appeal of Stellenbosch as business location was confirmed by the fact that the town was the first choice setting for more than half of businesses currently in operation, a trend which reiterates the importance of determining the motivation behind Stellenbosch as business location, being the primary choice for many establishments. An interpretation of the most significant influencing factors are summarised below.

7.2.2.1 Owner's hometown and quality of life

Stellenbosch possesses certain qualities and resources with the potential to be advantageous to such an extent that it provides adequate incentives for knowledge-driven industries to establish their businesses in town. The factor identified as, on average, being the most influential in this regard, specifically to single branch businesses, is that Stellenbosch was the business owner or key role-player's home town at the time the business was established. It was concluded that this phenomenon is strongly connected to the high quality of life associated with the town. Numerous Stellenbosch-based businesses stated that beautiful natural surroundings, the availability of good educational institutions and low crime rates are important considerations in business location choice, thus supporting similar perceptions in the research literature which emphasize the significance of factors pertaining to quality of life and the potential of small towns to attract service establishments (Beyer & Lindahl 1996; Castells 1991; Coffey and Shearmur 1997; Daniels & Bryson 2003; Rogerson 2002).

7.2.2.2 Proximity to clients

The Stellenbosch case study opposes the notion that IT-dependent service industries are footloose in nature. Proximity to either the majority of clients or a selected number of important clients ranked amongst the most crucial considerations in companies' choice of business location. In general, proximity to clients is of greater importance to secondary and relocated branches, many of which locate in Stellenbosch to be closer to their regional client base. This trend holds true for both national and international branches. The significance of

proximity to clients in determining business location implies that despite the service sector's general independence of geographically concentrated natural resources, they are still subservient to market demands, thus placing a certain degree of locational constraint on the spatial distribution of these industries. One such demand, receiving a lot of attention in service sector literature, concerns the necessity of face-to-face consultation between clients and service providers. Though the importance of face-to-face consultation is recognized by the majority of Stellenbosch-based establishments, it is in itself not the primary motivation behind locating at a specific site. Further investigation is required to better understand the somewhat ambiguous relationship between face-to-face consultation and the degree to which it dictates the importance of proximity to clients when considering a business location.

7.2.2.3 Highly-skilled labour

The service sector's heavy dependence on innovation and knowledge has received much attention in the research literature. Directly related to this issue is the availability of highly skilled and educated employees to ensure competitiveness within the local and global markets. Stellenbosch service establishments rated three different considerations related to a skilled labour force as of crucial importance in their decision to locate in the town.

Firstly, the town possesses significant environmental pull-factors which specifically attract highly-skilled employees who wish to sustain a certain quality of life. Characteristics such as beautiful natural surroundings, good educational opportunities for employees' children, lower crime rates, good cultural amenities, a more peaceful working environment and less traffic congestion support Stellenbosch's position as highly suitable location for attracting specialist employees who have the advantage of choosing employment at companies situated in environments which comply with their personal preferences.

A second labour-related consideration which ranked among the top ten crucial factors in determining business location regards the direct availability of highly-skilled university graduates. The vast majority of knowledge-workers in Stellenbosch have a tertiary level qualification and of all university graduates employed within the town's knowledge-driven service sector, almost two thirds obtained their most recent degree from Stellenbosch University. This supports the indicated preference towards Stellenbosch as business location based on the availability of highly-qualified graduates in the town. Further dynamics behind

this motivating factor was elaborated on in Chapter Six which investigated linkages between the knowledge-based service sector and Stellenbosch University.

Finally, apart from the potential to attract skilled labour and easy access to recently qualified graduates, Stellenbosch also possesses an excellent existing pool of highly educated specialists which encourage many establishments to settle in the town. International companies, in particular, place high value on the existing specialized labour force. The potential of Stellenbosch to draw new employees from elsewhere, is believed to be an influential contributing factor to the high prevalence of international head offices in town. This projection is supported by the fact that the majority of these headquarters fall within *Computer and Related Activities* category which are characterised by large highly-educated labour forces.

A general profile of the knowledge-driven labour force identifies high technology and financial institutions as being dominant within the Stellenbosch service sector in terms of stimulating economic development by means of employment growth. Not only are industries within the fields of *Computer and Related Activities* and *Technological Development* characterised by large labour forces but they also demonstrate the highest contribution in terms of annual employment growth. Since growth in employment opportunities can be used as a measure of development (Bailly 1995; Coffey & Polèse 1989; Marshall *et al.* 1988), the presence of the high-technology IT service industry in Stellenbosch confirm the prediction that this industry has the potential to stimulate regional economic development (Rogerson 2001). In addition, financial institutions also demonstrated large employee bases most likely to satisfy the large demand for accounting clerks who are often recent graduates undertaking their articles. *Accounting* establishments, *Insurance and Pension Funding* businesses and *Business Consultancy* activities also display high annual growth rates. It is interesting to note though that the labour forces of these categories are dominantly female as opposed to traditionally male-dominant high-tech and *Engineering* establishments where the number of male employees still significantly outweighs female averages.

Due to increased specialization as a result of flexible production and the necessity for innovation and knowledge in stimulating development, the service sector has become synonymous with the necessity of highly-educated employees. It is this nonnegotiable dependence on skilled human capital that, according to Castells (1991), places restrictions on

the so-called “footloose” nature of knowledge-based service industries. The empirical study of Stellenbosch confirms the significance of labour considerations in the choice of business location.

7.2.2.4 Useful business networks and prestigious address

The spatial clustering of business establishments was observed within Technopark and the Stellenbosch CBD. Technopark, housing a large percentage of *Computer and Related Activities* and *Technological Development* industries, is regarded by many businesses as a high status location associated with professional industries that allows for networking opportunities and attracting new clients. The second area centres on the more prestigious historic part of the Stellenbosch CBD, embodying the essence of the town’s unique sense of place. The literature stresses the significance of agglomeration economies resulting from the geographic concentration of related firms, one of which concerns the formation of useful business networks that promote inter-firm collaboration. However, although the majority of Stellenbosch-based service industries consider such business networks to be beneficial, the observed clusters in Stellenbosch did not correlate with specific opinions regarding these networks or inter-firm collaboration. An Average Nearest Neighbour analysis in ArcMap did however identify industries who regard prestigious address to have been a crucial factor in their locational decision-making process, as being significantly spatially concentrated within Technopark and the historic part of the Stellenbosch CBD. It can thus be concluded that, in addition to the attraction to Stellenbosch as town, many service industries regard the specific areas of Technopark and the Stellenbosch CBD as particularly prestigious locations within the town, leading to the spatial concentration of business establishments who value the status associated with these specific street and office locations.

The above summary highlighted conclusions drawn from the most significant results on locational considerations identified in the empirical Stellenbosch case study. Though the study has identified numerous individual factors and weighted their degree of importance, it is of the utmost importance to acknowledge that the locational decisions of service establishments are ultimately based on unique combinations of factors, which will differ from one establishment to the next according to the company’s line of business and related requirements. The study is however useful in identifying the main considerations generally deemed as being nonnegotiable in a service industry’s consideration of a specific site as a

business location. In conclusion, the locational concerns of the Stellenbosch service sector reiterates the most significant factors identified within a variety of international research on the location dynamics of the knowledge-based service sector.

7.2.3 Linkages between the knowledge-based service sector and Stellenbosch University

The benefits of collaboration between industries and R&D institutions such as universities are not only of significant interest to researchers, but is also receiving increasing attention from regional government who recognize the potential of the knowledge-based service industry to stimulate regional growth. The *White Paper on Preparing the Western Cape for the Knowledge Economy of the 21st Century* (WCPG 2001) is one such acknowledgement as it stresses the importance of networking, collaboration, and the sharing of knowledge between businesses and universities as knowledge-producers and drivers of innovation. The 2008 *Guide to Business and Investment in the Western Cape* (WESGRO 2008: 232) describes Stellenbosch as “an educational centre [that] is internationally recognized” and specifically identifies high-tech service industries and innovation-related research facilities as main industries in the town.

The Stellenbosch case study investigated the nature and extent of university-industry linkages. Two thirds of service establishments indicated proximity to SU to be generally advantageous in the operation of their business. The most significant relationship between knowledge-based service industries and SU centres on the tendency of the majority of service establishments to employ students on a full- or part-time basis. The use of students from the Faculties of Engineering and Economics and Management Sciences is particularly popular within *Computer and Related Activities* and *Accounting* firms respectively. Supporting the suggestion of dependence on student and recent graduate employment, these business categories are also amongst the most active participants in recruitment and job fairs organised by SU.

Research has indicated a significant shift towards flexible production in the New Economy which has lead to the vertical disintegration of company structures and the consequent outsourcing of many ancillary business activities to allow greater specialization within companies (Bryson, Daniels & Warf 2004; Coffey 1995). In addition to its role as provider of human capital, a mutually beneficial relationship exists between SU and the knowledge-based

service sector in terms of the outsourcing of specialised services. Not only is the University a client of certain service industries, but it is in itself a service provider offering R&D, innovation-driven consultation services essential to the development of the knowledge-based service industry. In the Stellenbosch service sector, *Computer and Related Activities*, *Technological Development* establishments and *Business Consultancies* in particular, benefit from symbiotic relationships with SU. In addition to services related to the intellectual capital offered by skilled University staff and students, many businesses within a variety of categories also indicated the frequent use of University facilities for staff training and related purposes.

A significant measure of the beneficial influence of proximity to universities is the occurrence of spin-off or start-up companies resulting from university-driven initiatives. The occurrence of a spatially concentrated high-tech industry cluster in Stellenbosch is interpreted as a direct spin-off from proximity to the University (WESGRO 2008). In addition to their frequent involvement in collaborative projects with SU, the high-tech industry includes the highest number spin-off companies of projects initiated by the SU, and specifically the Faculty of Engineering. The development of Technopark was in itself an initiative by SU who envisaged a science park that could accommodate commercial enterprises and academic entrepreneurship resulting from University-driven research and development projects. Although it has since become the location of a variety of industry types with no direct links to the University, Technopark still contains the largest Stellenbosch-based concentrations of establishments within the fields of *Computer and Related Activities* and *Technological Development* the majority of which still partake in collaborative projects with SU.

Though it might be true of selected establishments, it would be presumptuous to claim that the Stellenbosch knowledge-based service sector is dependent on the University for its' successful operation and development. However, the case study confirms that proximity to the University offers the local knowledge-based service sector a range of benefits, the most prominent of which includes the availability of a affordable student employees, the provision of a highly-educated and specialised work force, the mutual outsourcing of activities between industries and SU and the participation in innovation-driven collaborative projects which in some instances have lead to lucrative spin-offs. The Stellenbosch case study confirms the projections of many researchers who believe the geographic concentration of industries is required to benefit from the 'innovative milieu' where university-industry relationships are

facilitated by geographic and cultural proximity (Iammarino & McCann 2006; Lawton Smith & De Bernardy 2000; Oerlemans & Meeus 2005; Porter 1998; Rogerson 2001; Torre & Rallet 2005).

7.3 RECOMMENDATIONS FOR FUTURE RESEARCH

With a renewed emphasis on the importance of locality, brought on by the competitive nature of the global economy, new research demands will be placed on geographers. Despite his pioneering work, Rogerson (2002) admits that a need exists for further research on the locational dynamics of the high-order and knowledge-based service industries in South Africa. In response, the Stellenbosch research study investigated the nature of the knowledge-driven service industry within the context of a town peripheral to a large metropolitan area in order to determine the motivational factors influencing location choice. In doing so, it could be indirectly determined that the service sector is indeed not as ‘footloose’ as predicted by certain research constituencies. Although the empirical case study has succeeded in answering the research question by achieving its main research aims, the following aspects demand further attention:

- With the majority of studies in South Africa still focusing on a larger national scale and drawing comparisons between main metropolitan areas such as Johannesburg, Cape Town and Durban, the Stellenbosch case study comprised pioneering research of the knowledge-based service sector on the local scale of a medium-sized town. However, more in-depth research is required within the different local contexts of other towns to allow comparative investigations which will enable a better understanding of the location decisions of knowledge-based service industries and their potential to promote economic development on local, provincial and national scales.
- Special attention needs to be paid to the role of knowledge-based industries in promoting LED in small to medium-sized towns and peripheral regions to prevent the increase of regional disparities between urban and rural centres and to ensure the sustainability of the latter. This poses high demands considering the suggestion by numerous research studies, including the Stellenbosch case study, that the service sector is in fact not as ‘footloose’ in nature as perceived by some, but still subservient to spatial constraints such as the location of markets and client bases.

- Additional research on the occurrence and consequences of collaborations between universities and knowledge-based industries in other medium-sized towns as well as larger urban centres within South Africa will shed further light on the role of higher education institutes in contributing to local and regional economic development. In particular, the proposed distance-decay effect in university-industry collaboration, as proposed by Aslesen & Isaksen (2004), can be tested within a local context to better determine the importance of universities in influencing the location choice of R&D firms in South Africa.

- In the light of the increased awareness amongst the South African government and policy makers regarding the significant potential of the knowledge-based service sector to stimulate economic development, closer investigation into existing and potential collaboration efforts between local governments and service sector industries could be of immeasurable value.

- One of the major constraints in achieving the above-mentioned goals is noted by Rogerson (2001) who highlights the shortage of sufficient data as reason for the general lack of existing research on knowledge-intensive activities. Consequently, the Stellenbosch research study had as one of its objections, the generation of a new data source to enable further investigation into the nature, extent and locational decision-making of knowledge-based industries. The general lack of availability data and the difficulty in obtaining whichever incomplete data sources exist on both local and national levels, hold serious constraints for further research into the knowledge-based service sector and as such demands attention from agencies and institutions responsible for the generation of such content.

The South African literature and government policies pertaining to the knowledge-based service sector seem to mimic international phenomena by recognizing similar problems, albeit on a much smaller scale. However, as a developing country, a lag in the volume and depth of academic literature and subsequent empirical research on the new knowledge-based service economy is inevitable. It is thus understandable that research on the potential of the knowledge-based service sector to strengthen the competitive role of South Africa in the New Economy, have but scraped the surface of this intricate phenomenon. As one of few studies

which have explored the locational dynamics of the knowledge-based service sector on a local level, the case study undertaken in Stellenbosch is one of the first stepping stones to the innovative research that is required to gain a better understanding of how knowledge-based service industries have, and will contribute to the development of towns and medium-sized cities in South Africa, and the economy as a whole.

REFERENCES

- Albino V, Carbonara N & Petruzzelli AM 2007. *External knowledge sources and proximity: Towards a new geography of technology districts* [online]. Paper delivered at the Regional Studies Association International Conference, Lisbon. Available from: <http://www.regional-studies-assoc.ac.uk/events/020407papers.asp#> [Accessed 29 September 2007].
- Anselin L, Varga A & Acs Z 1997. Local geographic spillovers between university research and high technology innovations. *The Journal of Urban Economics* 42: 422 - 448.
- Anselin L, Varga A & Acs Z 2000. Geographical spillovers and university research: A spatial econometric perspective. *Growth and Change* 31: 501-515.
- Asián C 2003. *Advanced business services as a factor of the economic growth of a peripheral region: Possibilities of action* [online]. Paper delivered at the thirteenth International Conference of RESER, Mons. Available from: http://reser.net/index.php?action=telechargement&classeur_444 [Accessed 10 September 2007].
- Aslesen HW & Isaksen H 2004. *Knowledge intensive business services and urban-industrial development. Do KIBS cause increased geographic concentration of industries?* [online]. Paper delivered at the fourteenth International Conference of RESER, Mons. Available from: http://reser.net/index.php?action=telechargement&classeur_444 [Accessed 15 September 2007].
- Aslesen HW & Jakobsen SE 2007. The role of proximity and knowledge interaction between head offices and KIBS. *Tijdschrift voor Economische en Sociale Geografie* 98 (2): 188-201.
- Athreye SS & Keeble D 2002. Sources of increasing returns and regional innovation in the UK. *Regional Studies* 36 (4): 345-357.
- Bailly AS 1995. Producer services research in Europe. *Professional Geographer* 47 (1): 70-74.
- Bale J 1981. *The location of manufacturing industry*. 2nd ed. Edinburgh: Oliver & Boyd.
- Barnard WS 2001. *Conceptions of geography*. Stellenbosch: Centre for Geographical Analysis.

- Begg IG 1991. High technology location and the urban areas of Great Britain: Developments in the 1980s. *Urban Studies* 28 (6): 961-981.
- Beyers WB & Lindahl DP 1996. Lone eagles and high fliers in rural producer services. *Rural Development Perspectives* 11 (3): 2-10.
- Borja J & Castells M 1997: *Local and global: The management of cities in the information age*. London: Earthscan.
- Boschma RA 2005. Proximity and innovation: A critical assessment. *Regional Studies* 39 (1): 61–74.
- Bostock WW 1999. The global corporatisation of universities: Causes and consequences [online]. *AntePodium* 3: 1-20. Available from: <http://www.victoria.ac.nz/atp/articles/bostock.html> [Accessed 20 October 2007].
- Bryson JR, Daniels PW & Warf B 2004. *Service worlds: People, organisations, technologies*. London: Routledge.
- Bryson JR, Rusten G & Gammelsæter H 2003. *Road warriors and homelurkers in a developed market economy: Virtual and weightless organizational forms in the regional production and consumption of management consultancy expertise and knowledge in Norway* [online]. Paper delivered at the thirteenth international conference of RESER, Mons. Available from: http://reser.net/index.php?action=telechargement&classeur_444 [Accessed 10 September 2007].
- Burton-Jones A 1999. *Knowledge capitalism: Business, work, and learning in the new economy*. Oxford: Oxford University Press.
- CWDM (Cape Winelands District Municipality) 2006a. *Growth and Development Strategy (GDS): 2006-2014*. Stellenbosch: Cape Winelands District Municipality.
- CWDM (Cape Winelands District Municipality) 2006b. *Services Sector Study: January 2006*. Stellenbosch: Cape Winelands District Municipality.
- Castells M 1991. *The informational city: Information technology, economic restructuring and the urban-regional process*. Oxford: Blackwell Publishers.

- Castells M 1998. *The information age: Economy, society and culture: Volume 3 - End of millennium*. Malden, Mass.: Blackwell Business.
- Castells M 2000. *The rise of the network society*. 2nd ed. Oxford: Blackwell.
- Coffey WJ 1995. Producer services research in Canada. *Professional Geographer* 47 (1): 74-81.
- CIPRO (Companies and Intellectual Property Registration Office) 2008. *Standard Industrial Classification Codes* [online] Available from: http://www.cipro.gov.za/info_library/sic_codes.asp [Accessed 4 February 2008].
- Coffey WJ & Polèse M 1989. Producer services and regional development: A policy-oriented perspective. *Papers of the regional science association* 67: 13-27.
- Coffey WJ & Shearmur RG 1997. The growth and location of high order services in the Canadian urban system, 1971-1991. *Professional Geographer* 49 (4): 404-418.
- Cornelissen S 2006. 'Entrepreneurial regions'? The foreign relations of cities and provinces in South Africa. In Carlnaes W, Geldenhuys D & Nel P (eds) (forthcoming) *South African foreign and security policies in the post-apartheid era*. Aldershot: Ashgate.
- Curran J & Storey D 1993. *Small firms in urban and rural locations*. London: Routledge.
- Daniels PW 1985. *Service industries: A geographical appraisal*. New York: Methuen.
- Daniels PW 1993. *Service industries in the world economy*. Oxford: Blackwell Publishers.
- Daniels PW & Bryson JR 2002. Manufacturing services and servicing manufacturing: Knowledge-based cities and changing forms of production. *Urban Studies* 39 (5/6): 977-991.
- Daniels PW & Bryson JR 2003. *Business and professional services in a second city region: Linking local to global?* [online]. Paper delivered at the thirteenth International Conference of RESER, Mons. Available from: http://reser.net/index.php?action=telechargement&classeur_444 [Accessed 10 September 2007].

- Dangelico RM, Garavelli AC & Petruzzelli AM 2007. *A system dynamics model to analyze technology districts' evolution in a knowledge-based perspective* [online]. Paper delivered at the Regional Studies Association International Conference, Lisbon. Available from: <http://www.regional-studies-assoc.ac.uk/events/020407papers.asp#> [Accessed 29 September 2007].
- De Bruijn PJM 2004. Mapping innovation: Regional dimensions of innovation and networking in the Netherlands. *Tijdschrift voor Economische en Sociale Geografie* 95 (4): 433–440.
- Estall RC & Buchanan RO 1980. *Industrial activity and economic geography*. 4th ed. Johannesburg: Hutchinson.
- Florida R 1999. The role of the university: Leveraging talent, not technology. *Issues in Science and Technology* 15 (4): 67-73.
- Florida R 2005. *Cities and the creative class*. London: Routledge.
- GPG (Gauteng Provincial Government) s.a. Building *Gauteng as a globally competitive city region* [online]. Available from: <http://www.gautengonline.gov.za/miscimages/GCR/documents.htm> [Accessed 1 August 2007].
- GPG (Gauteng Provincial Government) 2007. *Provincial Economic Review and Outlook (PER&O)* [online]. Available from: www.gautengonline.gov.za/bin/ProvincialEconomicOutlook2007Report-final2.pdf [Accessed 1 August 2007].
- Gottman J 1970. Urban centrality and the interweaving of quaternary activities. *Ekistics* 29: 322-331.
- Harloe M & Perry B 2004. Universities, localities and regional development: The emergence of the 'mode 2' university. *International Journal of Urban and Regional Research* 28 (1): 212-223.
- Harrington WJ 1995. Empirical research on producer service growth and regional development: International comparisons. *Professional Geographer* 47 (1): 66–69.
- Harrison P 1994. Global economic trends: Some implications for local communities in South Africa. *Urban Forum* 5 (1): 73-89.

- Harvey D 1989. From managerialism to entrepreneurialism: The transformation in urban governance in late capitalism. *Geografiska Annaler* 71B: 3-17.
- Howells J 1988. *Economic, technological and locational trends in European services*. Sydney: Avebury.
- Howells JRL 2002. Tacit knowledge, innovation and economic geography. *Urban Studies* 39 (5/6): 871-884.
- Iammarino S & McCann P 2006. The structure and evolution of industrial clusters: Transactions, technology and knowledge spillovers. *Research Policy* 35: 1018-1036.
- Jakobsen SE & Aslesen HW 2004. *Location and knowledge interaction between head office and KIBS in city areas* [online]. Paper delivered at the fourteenth International Conference of RESER, Mons. Available from: http://reser.net/index.php?action=telechargement&classeur_444 [Accessed 10 September 2007].
- Keeble D & Nachum L 2002. Why do business service firms cluster? Small consultancies, clustering and decentralization in London and southern England. *Transactions Institute of British Geographers NS* 27: 67-90.
- Klaus P 2004. Urban settings in the competition among cities. *Revista Theomai* [online], 1 (009). Available from: <http://revista-theomai.unq.edu.ar/numero9/artklauss9.htm> [Accessed 24 July 2007].
- Knoben J & Oerlemans LAG 2006. Proximity and inter-organizational collaboration: a literature review. *International Journal of Management Review* 8 (2): 71-89.
- Lawton Smith H & De Bernardy M 2000. University and public research institute links with regional high-technology SMEs. In Keeble D & Wilkinson F (eds) *High- technology clusters, networking and collective learning in Europe*, 90-117. Aldershot: Ashgate.
- Lawton Smith H, Keeble D, Lawson C, Moore B & Wilkinson F 2001. University-business interaction in the Oxford and Cambridge regions. *Tijdschrift voor Economische en Sociale Geografie* 92 (1): 88-99.

- Litan RE, Mitchell L & Reedy EJ 2007. The university as innovator: Bumps in the road. *Issues in Science and Technology* 23 (4): 57-66.
- Longhi C & Keeble D 2000. High-technology clusters and evolutionary trends in the 1990s. In Keeble D & Wilkinson F (eds) *High-technology clusters, networking and collective learning in Europe*, 21-56. Aldershot: Ashgate.
- Lösch A 1954. *The economics of location*. New haven: Yale University Press.
- Mama A 2004. *Critical capacities: Facing the challenges of intellectual development in Africa* [online]. Inaugural address delivered at the Institute of Social Studies, The Hague. Available from: <http://www.iss.nl/content/download/6899/63480/file/mamainaugural%20.pdf> [Accessed 25 October 2007].
- Manuel TA 2002. The South African tax reform experience since 1994. Address delivered at the annual conference of The International Bar Association, Durban.
- Marcuse P 2002. Urban form and globalization after September 11th: The view from New York. *International Journal of Urban and Regional Research* 26 (3): 596-606.
- Marcuse P & Van Kempen R 2000. *Globalizing cities: A new spatial order?* Oxford: Blackwell Publishing.
- Markusen A, Hall P & Glasmeier A 1986. *High tech America: The what, how, where, and why of the sunrise industries*. Boston: Allen & Unwin.
- Marshall JN, Wood P, Daniels PW, McKinnon A, Bachtler J, Damesick P, Thrift N, Gillespie A, Green A & Leyshon A 1988. *Services and uneven development*. Oxford: Oxford University Press.
- Mather C 2007. Radical, Critical, Dissenting Geographies: *Quo Vadis* in the Post-apartheid era. Paper delivered at the 7th biennial conference of SSAG, Port Elizabeth.
- Mouton J 2003. African science in transition. *Science, Technology and Society* 8(2): 235-260.
- Nel EL 1999. *Regional and local economic development in South Africa: The experience of the Eastern Cape*. Aldershot: Ashgate.

- OECD (Organisation for Economic Co-operation and Development) 2005. *OECD factbook 2005: Economic, environmental and social statistics*. Paris: OECD Publishing.
- Oerlemans LAG & Meeus MTH 2005. Do organizational and spatial proximity impact on firm performance? *Regional Studies* 39 (1): 89–104.
- Pacione M 2005. *Urban geography: A global perspective*. 2nd ed. London: Routledge.
- Pirie G 2007. Reanimating a Comatose Goddess': Reconfiguring Central Cape Town. *Urban Forum* 18:125–151.
- Polèse M 1990. The office location problem: Implications for the growth and structure of cities in newly industrializing countries. *Review of Urban and Regional Development Studies* 3: 121-133.
- Porter M 1998. Clusters and the new economics of competition. *Harvard Business Review* 76 (6): 77-90.
- Pred A 1967. *Behavior and location: Foundations for a geographic and dynamic location theory, Part I*. Lund: Gleerup.
- Riddle D 1986. *Service-led growth: The role of the service sector in world development*. New York: Praeger.
- Rogerson CM 1994a. South Africa: From regional policy to local economic development initiatives. *Geography* 79: 180-183.
- Rogerson CM 1994b. Flexible production in the developing world: The case of South Africa. *Geoforum* 25 (1): 1-17.
- Rogerson CM 2000. Local economic development in an era of globalisation: The case of South African cities. *Tijdschrift voor Economische en Sociale Geografie* 91 (4): 397-411.
- Rogerson CM 2001. Knowledge-based or smart regions in South Africa. *South African Geographical Journal* 83 (1): 34-47.

- Rogerson CM 2002. Knowledge-based regions in the global periphery: The case of South Africa. In Hayter R & Le Heron R (eds) *Knowledge, industry and environment: Institutions and innovation in territorial perspective*, 313-335. Aldershot: Ashgate.
- SADC (Southern Africa Development Community) 2006. *SADC trade, industry and investment review 2006* [online]. Available from http://www.sadcreview.com/country_profiles/southafrica/southafrica.htm [Accessed 20 October 2007].
- Sassen S 1991. *The global city: New York, London, Tokyo*. New Jersey: Princeton University Press.
- Sassen S 2000. Cities in the global economy. In Paddison R (ed) *Handbook of urban studies*, 256–272. London: Sage.
- Shearmur R & Doloreux D 2007. Urban hierarchy or local milieu? High-order producer service and (or) knowledge intensive business service location in Canada, 1991-2001. *Innovation Systems Research Network* [online]. Available from: <http://www.utoronto.ca/isrn/publications/WorkingPapers/index.html> [Accessed 31 July 2007].
- Sorenson O & Baum JAC 2003. Geography and strategy: The strategic management of space and place. *Advances in Strategic Management*, 20: 1-22.
- South Africa (Republic of) 1996. *White paper on science and technology*. Pretoria: Department of Arts, Culture, Science and Technology.
- South African Reserve Bank 2005. *South African Reserve Bank Quarterly Bulletin: September 2005* [online]. Available from: www.reservebank.co.za/quarterlybulletin [Accessed 31 July 2007].
- STATSSA (Statistics South Africa) 2005. *Standard Industrial Classification of all Economic Activities (SIC)*. 6th ed. Pretoria: STATSSA.
- Stellenbosch Municipality 2007. *Integrated Development Plan (IDP)*. 2nd Generation – Original. Stellenbosch: Stellenbosch Municipality
- Sternberg R 2000. Innovation networks and regional development – evidence from the European Regional Innovation Survey (ERIS): Theoretical concepts, methodological approach, empirical basis and introduction to the theme issue. *European Planning Studies* 8: 389–407.

- Taylor PJ 2004. *World city network: A global urban analysis*. London: Routledge.
- The Presidency (Republic of South Africa) 2006a. *National Spatial Development Perspective (NSDP)*. Pretoria: Policy Coordination and Advisory Service.
- The Presidency (Republic of South Africa) 2006b. *Accelerated and shared growth initiative – South Africa (ASGISA): A summary*. Pretoria: Policy Coordination and Advisory Service.
- Torre A & Rallet A 2005. Proximity and localization. *Regional Studies* 39 (1): 47–59.
- Turok I 2001. Persistent polarisation post-apartheid? Progress towards urban integration in Cape Town. *Urban Studies* 38(13): 2349–2377.
- Van der Merwe IJ, Zietsman HL, Ferreira S, Davids AJ, Swart GP & Kruger D 2005. *Growth potential of towns in the Western Cape*. Stellenbosch: Centre for Geographical Analysis.
- Walker R 1985. Is there a service economy? The changing capitalist division of labour. *Science and Society* 49 (1): 42-83.
- Warf B 1989. Telecommunications and the globalization of financial services. *Professional Geographer* 41 (3): 257-271.
- WCPG (Western Cape Provincial Government) 2001. *White paper on preparing the Western Cape for the knowledge economy of the 21st century*. Cape Town: Department of Economic Affairs, Agriculture and Tourism Western Cape.
- WCPG (Western Cape Provincial Government) 2006. The provincial growth and development strategy (PGDS) which serves as a green paper for the Western Cape, P.N. 306 of 2006. *Provincial Gazette Extraordinary* 6385, 4.10.2006.
- WESGRO 2008. *Western Cape Business: A guide to business and investment in the Western Cape*. Cape Town: Global Africa Network.

APPENDIX A: LITERATURE REVIEW STATISTICS

Table A.1 Value added per sector in OECD countries as a percentage of total value added in 2003

OECD COUNTRY	BANKS, INSURANCE, REAL ESTATE AND OTHER BUSINESS SERVICES	GOVERNMENT, HEALTH, EDUCATION AND OTHER PERSONAL SERVICES	AGRICULTURE, HUNTING, FORESTRY AND FISHING	INDUSTRY, INCLUDING ENERGY	CONSTRUCTION	TRANSPORT, TRADE, HOTELS AND RESTAURANTS
AUSTRALIA	-	-	-	-	-	-
AUSTRIA	23.8	20.0	2.2	22.8	7.4	23.7
BELGIUM	28.5	24.7	1.3	20.8	4.8	19.9
CANADA	-	-	-	-	-	-
CZECH REPUBLIC	16.5	16.4	3.4	31.5	6.9	25.4
DENMARK	24.4	26.8	2.3	20.2	5.0	21.3
FINLAND	21.4	22.1	3.4	25.1	5.3	22.6
FRANCE	31.0	24.0	2.6	18.8	5.0	18.6
GERMANY	30.5	21.7	1.1	24.4	4.2	18.0
GREECE	21.3	21.0	6.6	13.9	9.0	28.2
HUNGARY	-	-	-	-	-	-
ICELAND	-	-	-	-	-	-
IRELAND	-	-	-	-	-	-
ITALY	27.3	20.0	2.5	21.6	5.0	23.5
JAPAN	-	-	-	-	-	-
KOREA	21.9	17.7	3.6	29.6	9.6	17.6
LUXEMBOURG	47.2	15.7	0.5	10.4	5.9	20.4
MEXICO	-	-	-	-	-	-
NETHERLANDS	-	-	-	-	-	-
NEW ZEALAND	-	-	-	-	-	-
NORWAY	19.3	22.8	1.4	31.8	4.6	20.1
POLAND	15.7	20.2	3.0	24.8	5.8	30.4
PORTUGAL	-	-	-	-	-	-
SLOVAK REPUBLIC	21.9	17.9	3.9	26.7	5.3	24.2
SPAIN	20.1	20.5	3.2	18.8	9.7	27.8
SWEDEN	24.2	27.3	1.8	22.9	4.4	19.4
TURKEY	9.2	14.9	11.9	25.1	3.6	35.4
UNITED KINGDOM	27.3	22.9	0.9	19.5	6.4	23.0
UNITED STATES	-	-	-	-	-	-

Source: OECD (Organisation for Economic Co-operation and Development) Factbook 2005

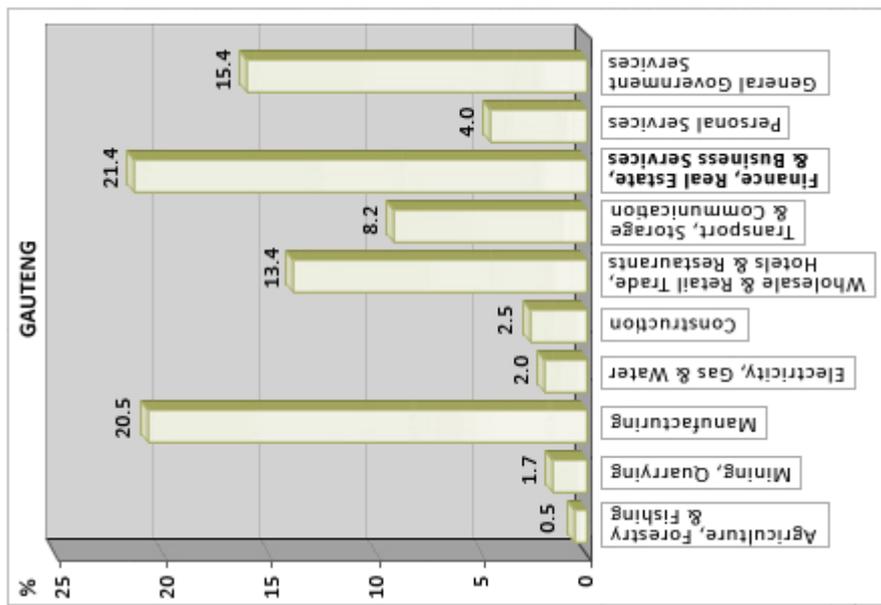


Figure A.1 Gross domestic product per region (percentage contribution), Gauteng, 2004

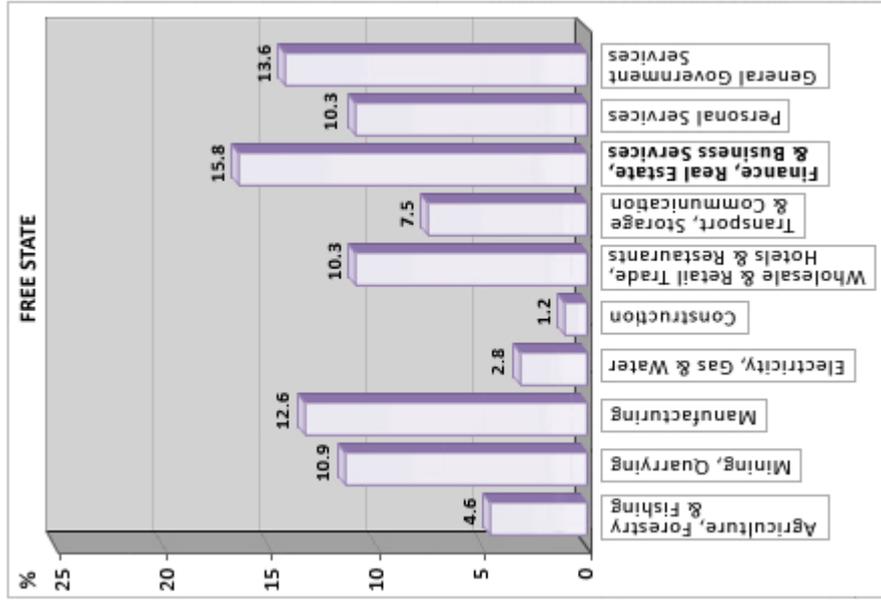
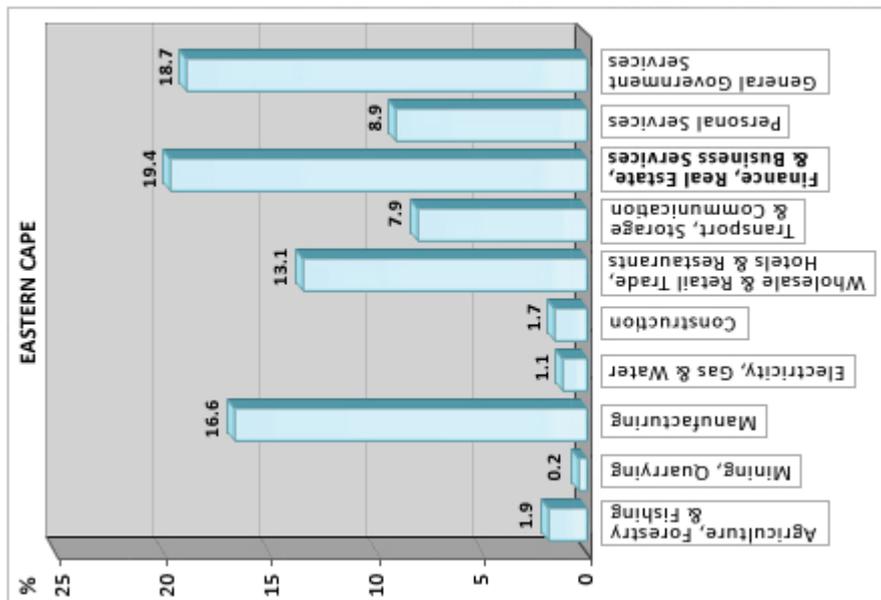
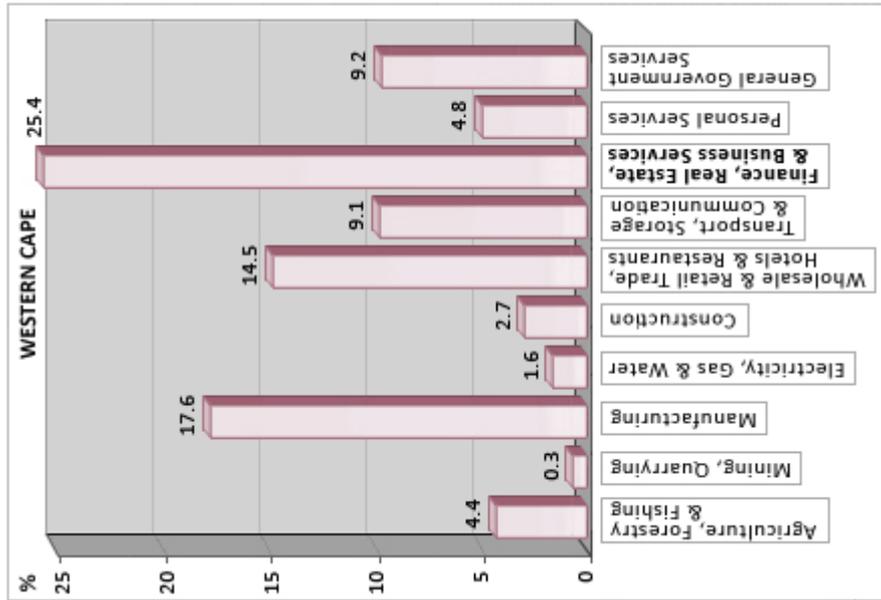


Figure A.2 Gross domestic product per region (percentage contribution), Free State, 2004



Source: STATS SA, GDP, annual estimates per region, 1995-2004

Figure A.3 Gross domestic product per region (percentage contribution), Eastern Cape, 2004



Source: STATS SA, GDP, annual estimates per region, 1995-2004

Figure A.4 Gross domestic product per region (percentage contribution), Western Cape, 2004

APPENDIX B: QUESTIONNAIRE ON THE NATURE AND LOCATIONAL DECISION-MAKING PROCESS OF KNOWLEDGE-BASED SERVICE INDUSTRIES IN STELLENBOSCH



UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
jou kennisvennoot · your knowledge partner

QUESTIONNAIRE ON THE NATURE AND LOCATIONAL DECISION-MAKING PROCESS OF KNOWLEDGE-BASED SERVICE INDUSTRIES IN STELLENBOSCH

This questionnaire forms an integral part of a Masters thesis investigating the influence of knowledge-based service industries on the development of Stellenbosch. The project emanates from an agreement between Stellenbosch University's Department of Geology, Geography and Environmental Studies and the broader *South Africa-Netherlands Research Programme on Alternatives in Development (SANPAD)*. Please visit <http://www.sanpad.org.za> for more details.

The project falls within the scope of Local Economic Development (LED) research and the purpose of the questionnaire is to acquire information about the characteristics of knowledge-based service industries, their employee profiles and determine these businesses' reasons for locating in Stellenbosch. By answering the following questions your business will greatly contribute towards a better understanding of the decision-making processes and location dynamics of service industries and their subsequent contributions towards the development of small towns.

The questionnaire must please be completed by a member of your company's managerial staff and/or any staff member with adequate knowledge of the company's history and who is familiar with employee details. Complete confidentiality is guaranteed and the information provided will be used for academic purposes only.

For more information feel free to contact **Ms Anita Adendorff** at maadendorff@sun.ac.za or cell **083 995 3485**. Alternatively you can also contact project supervisor Prof. Donaldson at (021) 808 3218 during office hours.

- **Please make a cross in the appropriate box, or write a number where indicated.**
- **Where a written answer is required, write it on the dotted line.**
- **Questions can be answered in Afrikaans, if so preferred.**
- **Return of this questionnaire within 2 weeks of receipt will be much appreciated.**

SECTION A: Business Overview

A1. Which of the descriptions below most accurately defines your business/organisation?

- A business with only one physical branch/office which is situated in Stellenbosch
- A branch/ office - but not the head office - of a national corporation
- A head office of a national corporation
- A branch/ office - but not the head office - of an international corporation
- A head office of an international corporation

A2. How long has the Stellenbosch branch of your business/organisation been in operation?

Less than a year	1-3 years	4-8 years	9-14 years	More than 15 years
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A2.1. If your business/organisation has more than one branch, in which year was the first branch established?

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A3. Which of the following categories most accurately describes the organisation’s line of business? If more than one is applicable, please choose the most appropriate.

- Financial Intermediation (e.g. monetary intermediation, central banking, lease financing, credit granting, etc.)*
- Insurance and Pension Funding (e.g. life insurance, medical aid funding, etc.)*
- Activities auxiliary to Financial Intermediation (e.g. financial market administration, security dealing, etc.)*
- Real Estate activities (e.g. property letting/ sales, real estate development, rent collecting, appraisals etc.)*
- Computer and Related Activities: (e.g. hardware consultancy, software consultancy, publishing and supply, data processing, database activities & distribution of electronic content, maintenance/repair of office machinery etc.)*
- Research and experimental development (e.g. general, agricultural, medical, industrial, biotechnology, etc.)*
- Other business activities (e.g. legal, accounting, tax consulting, market research, business, management or technical consultancy, architectural, engineering, advertising, etc.) Please specify:*

- Other (not listed above). Please specify:*

A4. Please indicate the frequency with which Information Technology (IT) is used for different purposes within your business/ organisation. Please note: For the purpose of this questionnaire, the term “Information Technology (IT)” refers to any hardware or software used within your business to capture, store, process or manipulate information.

	Often	Sometimes	Never
Communication			
Business Administration			
Research			
Product Development			
Service Provision			
Other (specify)			

A5. Please rate the importance of the following factors in the achievement of your organisation's core activities:

	Crucial to our organisation's success	Important	Necessary	Beneficial but not necessary	Not important
Face-to-face client consultation					
Inter-firm networks					
Proximity to competitors					
Research and development (R&D)					
A highly educated work force					
Convenient transport infrastructure					
The latest Information Technology (IT)					
Proximity to clients/markets					

SECTION B: Employees

B1. How many full-time and part-time employees are currently working within the Stellenbosch branch of your business/organisation? full-time employees part-time employees

B2. How many employees worked within the Stellenbosch branch of the business/organisation when it was first established? Please give an estimation if uncertain. employees

B3. Are you planning on appointing more employees within the next year? If yes, approximately how many?

No Yes, approximately employees

B4. Please indicate the approximate percentage of your employee base that uses a computer (or other Information Technology) on a daily basis: %

B5. Please complete the table on the following page including only details of current employees at the Stellenbosch branch.

- Should it be easier to print out an external document containing some or all of the required information (e.g. from a database), please do so and attach the additional documentation to the questionnaire.
- In the case of large businesses where providing individuals' details will be too time-intensive, approximate averages would be appreciated.
- The term *part-time* includes contract-based, half-day and/or other employees working less than the standard daily hours.

SECTION C: Business Location

C1. Which scenario best describes your business/organisation's situation?

- Our business/organisation was first situated in another town before it was relocated to Stellenbosch (*if so, please continue to Question C1.1.*)
- The Stellenbosch branch was opened after our business/organisation already had one or more branches/offices established elsewhere (*if so, please continue to Question C1.2.*)
- This is the first and only existing branch/office of our business/organisation (*if so, please continue to Question C2.*)
- This is the first but not the only established branch/office of our business/organisation (*if so, please continue to Question C2.*)

C1.1. If your business/organisation relocated to Stellenbosch from elsewhere, where was it originally located?

- Cape Town
- Northern suburbs *Specify:*
- Southern suburbs *Specify:*
- Other town in the Western Cape *Specify:*
- Other province *Specify town:*
- Other country *Specify:*

(Please continue to question C2.)

C1.2. If the Stellenbosch branch office was opened after your business/ organisation already had offices elsewhere, where is your head office currently located?

- Cape Town
- Northern suburbs *Specify:*
- Southern suburbs *Specify:*
- Other town in the Western Cape *Specify:*
- Other province *Specify town:*
- Other country *Specify:*

(Please continue to question C2.)

C2. Please indicate the importance of the following factors in influencing your choice of Stellenbosch as location for your business/ organisation.

Factors influencing your choice of Stellenbosch as business location	Crucial	Beneficial	Not important
Stellenbosch is/was the owner/key role-player's hometown.			
Stellenbosch is the closest location to the majority of your clients/customers.			
Stellenbosch is the closest location to your most important clients/ customers.			
Stellenbosch is a location that attracts highly educated/specialist employees.			
Stellenbosch has an excellent pool of highly educated specialists in your line of business.			

Factors influencing your choice of Stellenbosch as business location	Crucial	Beneficial	Not important
Stellenbosch is a good location for finding highly-skilled university graduates.			
Stellenbosch is closely situated to convenient transport links.			
Stellenbosch is closely situated to Cape Town.			
Stellenbosch has beautiful natural surroundings.			
Stellenbosch has a good mix of social and cultural amenities.			
Stellenbosch allows tax benefits.			
Stellenbosch allows rent benefits.			
Stellenbosch allows certain other financial benefits.			
Stellenbosch is a university town.			
Stellenbosch provides good public services.			
Stellenbosch provides a better quality of life for employees.			
Stellenbosch has an attractive/suitable climate.			
Stellenbosch is safer than other areas in terms of crime.			
Stellenbosch provides good primary/secondary education opportunities for employees' children.			
Your business is closely situated to tertiary institutions (excl. the university).			
Your business is closely situated to Research and Development institutions (e.g. CSIR).			
Your business is closely situated to similar firms in the same industry.			
Your business is situated at a prestigious address / office park.			
Your business is closely situated to useful business networks.			
Your business is closely situated to useful government resources.			
Please specify any other factors, not listed above, that were influential in your decision to establish or move your organization to Stellenbosch:			
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C3. Do you own or rent the office in which your business is located?

Own Rent Other. Please specify:

C4. Please indicate what approximate percentage of your client base is located in each of the following locations (adding up to 100%):

- _____ % of our clients are situated in Stellenbosch
- _____ % of our clients are situated in small towns in the surrounding area (e.g. Somerset-West, Paarl, Worcester)
- _____ % of our clients are situated in Cape Town (including Northern and Southern suburbs)
- _____ % of our clients are situated in other provinces.
Please list province(s):
- _____ % of our clients are situated in other countries.
Please list countries:

C5. Provided sufficient Information and Communication Technologies (ICT) are available, would your organisation be able to function as effectively in another small town as it does in Stellenbosch? If no, please specify why not.

- Yes No, because

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C6. What (if any) are the advantages of being situated in Stellenbosch as opposed to Cape Town or other large cities?

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SECTION D: University Collaboration

D1. Do you consider close proximity to Stellenbosch University as an advantage to your business?

- Yes No Other

If *Other* please specify

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.....

D2. Please indicate which of the following links exist between your business/organisation and Stellenbosch University.

Links with Stellenbosch University	Often	Sometimes	Never
Our business/organisation outsources certain activities to Stellenbosch University.			
Stellenbosch University outsources certain activities to our business/organisation.			
Stellenbosch University is one of our customers/clients.			
Our business/organisation does consultation work for Stellenbosch University.			
Stellenbosch University does consultation work for our business/organisation.			
Our business/organisation is involved in collaborative projects with Stellenbosch University.			
Our business/organisation participates in postgraduate research (e.g. Honours'/ Masters' theses).			
Our business/organisation makes use of students to conduct research on our behalf.			
Our business/organisation uses Stellenbosch University facilities for training or other purposes.			
Our business/organisation has bought products patented by Stellenbosch University or one of its staff members.			
Our business/organisation employs students on a full or part-time basis.			
Our business/organisation participates in recruitment/job fairs presented at or organised by Stellenbosch University.			
Our business/organisation is a spin-off from a project initiated by Stellenbosch University.			
Our business/organisation uses Stellenbosch University students/staff for Research and Development purposes.			

D3. If you make use of students or staff from Stellenbosch University for work or research purposes, which departments and/or Faculties are they associated with?

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.....

THANK YOU VERY MUCH FOR YOUR KIND CO-OPERATION.

APPENDIX C: STANDARD INDUSTRIAL CLASSIFICATION (SIC)
INCLUDING *DIVISIONS* AND *MAJOR GROUPS*

MAJOR DIVISION 1: AGRICULTURE, HUNTING, FORESTRY AND FISHING		
Agriculture, hunting and related services	11	
Forestry, logging and related services	12	
Fishing, operation of fish hatcheries and fish farms	13	
MAJOR DIVISION 2: MINING AND QUARRYING		
Mining of coal (hard) and lignite (brown coal)	21	
Extraction of crude petroleum oils and natural gas; service activities incidental to oil and gas extraction, excluding surveying	22	
Mining of gold and uranium ore	23	
Mining of metal ores, except gold and uranium ore	24	
Other mining and quarrying	25	
Services activities incidental to mining of minerals	29	
MAJOR DIVISION 3: MANUFACTURING		
Manufacture of food products, beverages and tobacco products	30	
Manufacture of textiles, clothing and leather goods	31	
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; manufacture of paper and paper products; publishing,	32	
Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	33	
Manufacture of other non-metallic mineral products	34	
Manufacture of basic metals, fabricated metal products, machinery and equipment and of office, accounting and computing machinery	35	
Manufacture of electrical machinery and apparatus n.e.c.	36	
Manufacture of radio, television and communication equipment and apparatus and of medical, precision and optical instruments, watches and clocks	37	
Manufacture of transport equipment	38	
Manufacture of furniture; manufacturing n.e.c.; recycling	39	
MAJOR DIVISION 4: ELECTRICITY, GAS AND WATER SUPPLY		
Electricity, gas, steam and hot water supply	41	
Collection, purification and distribution of water	42	
MAJOR DIVISION 5: CONSTRUCTION		
Construction	50	
MAJOR DIVISION 6: WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES, MOTOR CYCLES AND PERSONAL AND HOUSEHOLD GOODS;		
Wholesale and commission trade, except of motor vehicles and motor cycles	61	
Retail trade, except of motor vehicles and motor cycles; repair of personal household Goods	62	
Sale, maintenance and repair of motor vehicles and motor cycles; retail trade in automotive fuel	63	
Hotels and restaurants	64	

STANDARD INDUSTRIAL CLASSIFICATION (SIC)	DIVISION	MAJOR GROUPS
MAJOR DIVISION 7: TRANSPORT, STORAGE AND COMMUNICATION		
Land transport; transport via pipelines	71	
Water transport	72	
Air transport	73	
Supporting and auxiliary transport activities; activities of travel agencies	74	
Post and telecommunications	75	
MAJOR DIVISION 8: FINANCIAL INTERMEDIATION, INSURANCE, REAL ESTATE AND BUSINESS SERVICES		
<i>Financial Intermediation, except insurance and pension funding</i>	81	
Monetary intermediation		811
Other financial intermediation n.e.c.		819
<i>Insurance and Pension Funding, except compulsory social security</i>	82	821
<i>Activities auxiliary to Financial Intermediation</i>	83	
<i>Activities auxiliary to Financial Intermediation, except insurance and pension funding</i>		831
Activities auxiliary to insurance and pension funding		832
<i>Real Estate activities</i>	84	
<i>Real Estate activities with own or leased property</i>		841
<i>Real Estate activities on a fee or contract basis</i>		842
Renting of machinery and equipment, without operator, and of personal and household goods	85	Excl.
Renting of transport equipment		851
Renting of other machinery and equipment		852
Renting of personal and household goods n.e.c.		853
<i>Computer and Related Activities</i>	86	
Hardware consultancy		861
Software consultancy, publishing and supply		862
Data processing		863
Data base activities and on-line distribution of electronic content		864
Maintenance and repair of office, accounting and computing machinery		865
Other computer related activities		869
Research and <i>experimental</i> development	87	
Research and experimental development of natural sciences and engineering (NSE)		871
Research and experimental development of social sciences and humanities (SSH)		872
Other business activities	88	
Legal, accounting, bookkeeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy activities		881
Architectural, engineering and other technical consultants activities (other than engineers) n.e.c.		882
Advertising		883
Business activities n.e.c.		889

STANDARD INDUSTRIAL CLASSIFICATION (SIC)	DIVISION	MAJOR GROUPS
MAJOR DIVISION 9: COMMUNITY, SOCIAL AND PERSONAL SERVICES		
Public administration, compulsory social security and defense activities	91	
National and Provincial government activities		911
Local government activities		912
Education	92	
Educational services		920
Health and social work	93	
Human health activities		931
Veterinary activities		932
Social work activities		933
Sewage and refuse disposal, sanitation and similar activities	94	940
Activities of membership organizations n.e.c.	95	
Activities of business, employers' and professional organizations		951
Activities of trade unions		952
Activities of other membership organizations		959
Recreational, cultural and sporting activities	96	
Motion picture, radio, television and other entertainment activities		961
News agency activities		962
Library, archives, museums and other cultural activities		963
Sporting and other recreational activities		964
Other service activities	99	
All kinds of depot		999
MAJOR DIVISION 0: PRIVATE HOUSEHOLDS AS EMPLOYERS AND UNDIFFERENTIATED PRODUCTION ACTIVITIES OF PRIVATE HOUSEHOLDS,		
Private households as employers of domestic staff	01	010
Undifferentiated goods-producing activities of private households for own use	02	020
Undifferentiated service-producing activities of private households for own use	03	030
Exterritorial organizations	04	040
Representatives of foreign governments	05	050
Not economically active people, beggars, people living from handouts, charity, etc.	06	060
Unemployed people, people seeking work, etc.	07	070
Unspecified activities	08	080
Other activities not adequately defined	09	090

APPENDIX D: FINAL CONSTRUCTED RESEARCH POPULATION DATABASE

COMPANY	ID	PARTICIPANT ³²	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
AC LOMBARD AH	316		-33.939536	18.856643		98	DORP ST.	CENTRAL
ACTIVE SYSTEMS	247	YES	-33.940570	18.856758		10	KRIGE ST.	CENTRAL
ACUO TECHNOLOGIES	167		-33.963791	18.834262		35	ELECTRON ST.	TECHNOPARK
ADPOINT TRADING/ GRYPHON FINANCIAL	5	YES	-33.938309	18.861901	ANDMAR BUILDING	41	CHURCH ST.	CENTRAL
AESTHETIC PERSONNEL SERVICES	72		-33.936868	18.860220	AAN DE GRAGT BUILDING	5	PLEIN ST.	CENTRAL
AFRICAN ECO RESOURCE DEVELOPMENT	136		-33.946467	18.862456		4	PIET RETIEF ST.	KRIGEVILLE
AFRICAN SUN MEDIA	252	YES	-33.932849	18.863568	ADMINISTRATION A		RYNEVELD ST.	UNIVERSITY CAMPUS
AGRI-AFRICA CONSULTANTS	46	YES	-33.955154	18.855070		38	RHODES AVE. SOUTH	DIE BOORD
AGT CONSULTING	215		-33.925796	18.851037		1	BRIDGE RD.	PLANKENBURG
ALERT SECURITY SYSTEMS	217		-33.942511	18.859730	VALERIDA BUILDING		PIET RETIEF ST.	KRIGEVILLE
ALET BEKKER	173		-33.938087	18.861262	OUDE HOEK BUILDING		ANDRINGA ST.	CENTRAL
ALEXANDER FORBES FINANCIAL SERVICES	41	YES	-33.940053	18.853556		40	DORP ST.	CENTRAL
ALVES DA CUNHA BROKERS	227		-33.926096	18.878166	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
AMPRO DEVELOPMENT PROJECTS	11	YES	-33.932179	18.859189	MERRIMAN PLACE		MERRIMAN ST.	CENTRAL
ANDREW HORNE ARCHITECTS	228		-33.938409	18.863708		3	DROSTDY ST.	CENTRAL
ANEL BLIGNAUT ENVIRONMENTAL	54		-33.952952	18.849935		72	LOVELL AVE.	DIE BOORD
ANELMA VAN RIET & ASSOCIATES	71		-33.937164	18.860663	GOOD HOPE BUILDING	23	PLEIN ST.	CENTRAL
ANGLO AFRICAN	6	YES	-33.937034	18.860098	ANGLO AFRICAN BUILDING	4	PLEIN ST.	CENTRAL
ANNA BASSON PROPERTIES	3	YES	-33.937179	18.861117		33	PLEIN ST.	CENTRAL
ANNA KOTZE CONSULTANTS	234		-33.942511	18.859730	VALERIDA BUILDING		PIET RETIEF ST.	KRIGEVILLE
ARC INFRUITEC	37	YES	-33.925015	18.873521			HELSHOOGTE WAY	IDAS VALLEY
ARCUS GIBB	201		-33.946128	18.853856			STRAND RD.	CENTRAL
ARGO MARKETING	182		-	-			DEVON VALLEY RD.	DEVON VALLEY
ASK AFRICA	327	NEW	-33.938301	18.851858		19	HEROLD ST.	CENTRAL
ATTIX5	255		-33.964428	18.839565	ATTIX 5 HOUSE	8	QUANTUM ST.	TECHNOPARK
AVID MOBILE NETWORK	67	YES	-33.937034	18.860098	ANGLO AFRICAN BUILDING	4	PLEIN ST.	CENTRAL
BAARSMa	256		-33.978712	18.840962	BLAAUWKLIP OFFICE PARK		WEBERSVALLEI RD.	JAMESTOWN
BALLTRON	202		-33.964459	18.831998	BALLTRON PARK	43	NEUTRON ST.	TECHNOPARK
BART SENEKAL	135	YES	-33.936485	18.853447		10	ALEXANDER ST.	CENTRAL

³² NEW=establishments identified after questionnaires had been distributed. These businesses are still included in the maps on p59 and p60.

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
BASSEAW FINANSIELE DIENSTE	106		-33.948801	18.851203		28	FORELLE SINGEL	DIE BOORD
BEAUTECH	134	YES	-33.939250	18.851692	BLUMENHOF		BLERSCH ST.	CENTRAL
BECKER MALHERBE TERREBLANCHE	122		-33.936910	18.878655		5	ROWAN ST.	MOSTERTSDRIFT
BEN BURGER ARCHITECT	235		-33.957064	18.857826	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
BESTER VOER EN GRAANBEURS	123		-33.936899	18.862484	OUDE BLOEMHOF		PLEIN ST.	CENTRAL
BILL TAYLOR & ASSOCIATES	137		-33.937294	18.884652		16	THIBAULT ST.	MOSTERTSDRIFT
BINFIN	203		-33.937316	18.862948		19	RYNEVELD ST.	CENTRAL
BIOMER SYSTEMS	257		-33.933780	18.891639		18	HENDRIK BERGH ST.	ROZENDAL
BLIO	328	NEW	-33.964770	18.835566	INNOVATION CENTRE 1		MESON ST.	TECHNOPARK
BLUE CHIP FINANCE (HEAD OFFICE)	66		-33.939536	18.856643		98	DORP ST.	CENTRAL
BLUE CUBE SYSTEMS	317		-33.929222	18.852654		14	STOFFEL SMIT ST.	PLANKENBURG
BONDPRO FINANCIAL SERVICES	139		-33.964414	18.838937	QUANTUM HOUSE		QUANTUM ST.	TECHNOPARK
BOTHA YOTTIE ATTORNEYS	55		-33.948023	18.846709		29	LOVELL AVE.	DIE BOORD
BRAXTON CONSULTING	258		-33.938203	18.848790	DORP SQUARE		DISTILLERY RD	ONDERPAPEGAAIBERG
BROCO TRANSPORT CONSULTANTS	16	YES	-33.965787	18.838626		5	TERMO ST.	TECHNOPARK
BSO (BERNARD SHAW AUDITORS)	259		-	-		23	QUANTUM ST.	TECHNOPARK
BUREAU FOR ECONOMIC RESEARCH	329	NEW	-33.943250	18.834783	THE VINEYARD CENTRE		DEVON VALLEY &	DEVON VALLEY
BUSINESS PARTNERS	14	YES	-33.957064	18.857826	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
CALA MOLLER ARCHITECTS	7	YES	-33.938138	18.851350		11	BLERSCH ST.	CENTRAL
CAMPBELL SCIENTIFIC AFRICA	140		-33.965431	18.836389	MBV BUILDING	1	MESON ST.	TECHNOPARK
CAPE PC SERVICES	144		-33.926800	18.856660		4	VOORPLEIN ST.	LA COLLINE
CAPITEC BANK (HEAD OFFICE)	260		-33.964958	18.840454		14	QUANTUM ST.	TECHNOPARK
CARINUS STRYDOM	110	YES	-33.956774	18.858407	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
CARLA ACKERMAN DYNAMIC	56		-33.936924	18.828389		18	TARENDAAL ST.	ONDERPAPEGAAIBERG
CENTRE FOR RURAL LEGAL STUDIES	261		-33.935911	18.860636	EIKESTAD MALL		ANDRINGA ST.	CENTRAL
CHENNELS ALBERTYN ATTORNEYS	141		-33.936337	18.857987		44	ALEXANDER ST.	CENTRAL
CHRIS DE HART ARCHITECTS	156		-33.963388	18.856991		1	REPENS ST.	PARADYSKLOOF
CHRISTO MARAIS ATTORNEY	57		-33.946128	18.853856	DOORBOSCH CENTRE		STRAND RD	CENTRAL
CIATTI SA	318		-33.965214	18.839033		17	TERMO ST.	TECHNOPARK
CJ VAN DRUTEN	147	YES	-33.978712	18.840962	BLAAUWKLIIP OFFICE PARK		WEBERSVALLEI RD	JAMESTOWN
CLAUDIUS CLAASEN & ASSOCIATES	104	YES	-33.967231	18.854586		2	GRANDICEPS ST.	PARADYSKLOOF
CLUVER MARKOTTER ATTORNEYS	262		-33.938238	18.859717	CLUVER MARKOTTER		MILL ST.	CENTRAL

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
CMI AFRICA	191		-33.962890	18.837480	STARGROW BUILDING		ELECTRON ST.	TECHNOPARK
CODEX DIGITAL DESIGN STUDIO	263		-33.950667	18.855795		20	BARRY ST.	DALSIG
COMPUSCAN INFORMATION TECHNOLOGIES	264		-33.957241	18.858085	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
CORONATION FUND MANAGER	96		-33.938309	18.861901	ANDMAR BUILDING	41	CHURCH ST.	CENTRAL
CREO DESIGN	17	YES	-33.964282	18.839688	TECHNOSTELL BUILDING	11	QUANTUM ST.	TECHNOPARK
CS DHELMINIE FINANCE PLAN	108		-33.923311	18.877989		21	ERASMUS SMIT ST.	IDAS VALLEY
CS PROPERTY GROUP	117		-33.964836	18.837992	TIMES SQUARE		ELECTRON ST.	TECHNOPARK
CSENSE SYSTEMS	330	NEW	-33.965260	18.839026				TECHNOPARK
CSIR	163		-	-		11	JAN CILLIERS ST.	CENTRAL
CT LAB	232		-33.965260	18.839026		15	TERMO ST.	TECHNOPARK
DAS COMMODITIES	248	YES	-33.966063	18.835539	ZIDELA HOUSE	30	TECHNO DR.	TECHNOPARK
DAVIS LANGDON FARROW LAING	265		-33.964836	18.837992	TIMES SQUARE	9	ELECTRON ST.	TECHNOPARK
DE LANGE PROPERTIES INVESTMENTS	216		-33.949904	18.853907		32	RHODES-NORTH ST.	DIE BOORD
DE LEEUW / SOVEREIGN SEEKER	266		-33.938417	18.854764		23	MARKET ST.	CENTRAL
DE MUNCK ATTORNEY	267		-33.934784	18.860669	DE WAAL CENTRE		ANDRINGA ST.	CENTRAL
DE VILLIERS & MOORE	73	YES	-33.937523	18.855563		41	HERTE ST.	CENTRAL
DEKKER BESTER ARCHITECTS	131		-33.966214	18.836995			TECHNO DR.	TECHNOPARK
DEN HARTOG & KLEYNHANS	26	YES	-33.942511	18.859730	VALERIDA BUILDING		PIET RETIEF ST.	KRIGEVILLE
DENNIS MOSS PARTNERSHIP	214		-33.938692	18.854793		17	MARKET ST.	CENTRAL
DERCKSEN & KIE	268		-33.937874	18.862707		38	CHURCH ST.	CENTRAL
DEVTRUST PROPERTY CONSULTANTS	319		-33.937874	18.862707		38	CHURCH ST.	CENTRAL
DI MANAGEMENT SOLUTIONS	233		-33.967305	18.840051			TECHNO DR.	TECHNOPARK
DICK CRANE ARCHITECTS	53	YES	-33.933127	18.860292	ANDRINGA HOF	5	ANDRINGA ST.	CENTRAL
DIRK HATTING & ASSOCIATES	269		-33.964957	18.835917	INNOVATION CENTRE 2	7	MESON ST.	TECHNOPARK
DIRK JOUBERT ATTORNEYS	97	YES	-33.938309	18.861901	ANDMAR BUILDING	41	CHURCH ST.	CENTRAL
DISCOVERY CONSULTING SERVICES WEST	23	YES	-33.966063	18.835539	ZIDELA HOUSE	30	TECHNO DR.	TECHNOPARK
DPE CONSULTING ENGINEERS	59		-33.952952	18.849935		72	LOVELL AVE.	DIE BOORD
E.MEAKER	86		-33.938191	18.861714	OLD COLLEGE BUILDING	35	CHURCH ST.	CENTRAL
EARTH CORE CONNECTIONS INTERNATIONAL	61		-33.938711	18.861875		149	DORP ST.	CENTRAL
ECOSENSE	58	YES	-	-		26	KLEINVALLEI ST.	ONDERPAPEGAAIBERG
EDH	331	NEW	-33.964490	18.838424				TECHNOPARK
EFFECTIVE LOANS TRUST	171		-33.934784	18.860669	DE WAAL CENTRE	15	ANDRINGA ST.	CENTRAL

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
EIKESTAD AUTOLAB	218		-33.923922	18.851832	PLANKENPARK 2		LINTON RD.	PLANKENBURG
ELECTROCOMP HOLDING	114		-33.962950	18.839211	DATA VOICE HOUSE	16	ELECTRON ST.	TECHNOPARK
ELEKTRONIKTEIL	130		-33.939561	18.831571		6	SWAWEL LANE	ONDERPAPEGAAIBERG
ELEMENT CONSULTING	77		-33.937613	18.855625		39	HERTE ST.	CENTRAL
ELMO ESTERHUYSE & ASSOCIATES	271		-33.976939	18.839817		3	STRAND RD.	CENTRAL
EM SOFTWARE & SYSTEMS (EMSS)	81	YES	-33.966179	18.835230		32	TECHNO DR.	TECHNOPARK
ENTEK BELEGGINGS	219		-33.965788	18.840559		25	QUANTUM ST.	TECHNOPARK
ERASMUS ACCOUNTANTS	246	YES	-33.966063	18.835539	ZIDELA HOUSE	30	TECHNO DR.	TECHNOPARK
ETSE ELECTRONICS	253	YES	-33.964770	18.835566	INNOVATION CENTRE 1		MESON ST.	TECHNOPARK
EVEDROP COMMUNICATIONS	83		-33.938309	18.861901	ANDMAR BUILDING	41	CHURCH ST.	CENTRAL
EXACCT ACCOUNTING	43	YES	-33.942511	18.859730	VALERIDA BUILDING		PIET RETIEF ST.	KRIGEVILLE
EXACT AFRICA PROPERTY SOLUTION CO	184		-33.938203	18.848790	DORP SQUARE	106B	DISTILLERY RD.	ONDERPAPEGAAIBERG
EXCEED GROUP	322		-33.942594	18.847263	MILLENIA PARK	16	STELLENBERG AVE.	CENTRAL
FALCK ATTORNEYS	274		-33.935549	18.859085	DROSTDY CENTRE		BIRD ST.	CENTRAL
FAST STEP FINANCE	98		-33.936945	18.860514	SEMPER BUILDING	8	PLEIN ST.	CENTRAL
FINANSOLL	195		-33.925077	18.876379		4	HELSHOOGTE WAY	IDAS VALLEY
FINOCUS FINANCIAL PLANNERS	240	YES	-33.935911	18.860636	EIKESTAD MALL		ANDRINGA ST.	CENTRAL
FISCHER, MALHERBE & KRIEL	169		-33.938340	18.860120		6	BIRD ST.	CENTRAL
FLOOR INC.	115	YES	-33.962890	18.837480		21	ELECTRON ST.	TECHNOPARK
FLOTRON TECHNOLOGY	90	YES	-33.966460	18.838159		18	TECHNO DR.	TECHNOPARK
FOLIOTEK	204		-33.965787	18.838626		5	TERMO ST.	TECHNOPARK
FOTO STUDIO LOCKLEY	68		-33.937420	18.860419		21	PLEIN ST.	CENTRAL
FRANCOIS J VAN DER MERWE	185	YES	-33.938680	18.861963		149	DORP ST.	CENTRAL
FRANCOIS KRUGER PHOTOGRAPHY	220	YES	-33.901162	18.850838		14	MOUNTAIN SILVER DR.	WELGEVONDEN
FRANKLIN COVEY ORGANISATION SERVICES	275		-33.934568	18.837806		21	FISANT ST.	ONDERPAPEGAAIBERG
FRED DE KOCK & PARTNERS	190		-33.938441	18.863559		182	DORP ST.	CENTRAL
FREEWORLD COATINGS RESEARCH CENTRE	178		-33.933020	18.865780	POLIMEER BUILDING		DE BEER ST.	UNIVERSITY CAMPUS
FRIEDLAENDER BURGER & VOLKMANN	82		-33.937949	18.861854		27	CHURCH ST.	CENTRAL
FVM PROJECTS	79	YES	-33.939893	18.855336		63	DORP ST.	CENTRAL
G2 DESIGN	24	YES	-33.939823	18.854627	BLACK HORSE CENTRE		DORP & MARK ST.	CENTRAL
GAUSSIAN	15	YES	-33.939202	18.858214		99	DORP ST.	CENTRAL
GENASYS TECHNOLOGIES	276		-33.965322	18.838533		13	TERMO ST.	TECHNOPARK

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
GENEALOGICAL INSTITUTE OF SA (GISA)	161		-33.930607	18.862453		115	BANGHOEK WAY	CENTRAL
GENERAL & MEDICAL GROUP	121		-33.966250	18.838920	BRANDWACHT OFFICE PARK	3	TERMO ST.	TECHNOPARK
GEOSS	31	YES	-33.964282	18.839688	TECHNOSTELL BUILDING	9	QUANTUM ST.	TECHNOPARK
GERHARD GOUS ATTORNEY	277		-33.936021	18.862528	RYNEVELD PLAZA	7	RYNEVELD ST.	CENTRAL
GERHARD UYS C.ACCOUNTANT	278		-33.942511	18.859730	VALERIDA BUILDING		PIET RETIEF ST.	KRIGEVILLE
GERIBEL INVESTMENTS	244	NEW	-33.936868	18.860220	AAN DE GRAGT BUILDING	5	PLEIN ST.	CENTRAL
GEUSTYN LOUBSER STREICHER (GLS) (GLS) /	32	YES	-33.964552	18.837789		11	ELECTRON ST.	TECHNOPARK
GILLMOUR PURDON	28	YES	-33.938813	18.860638	PURDON GILMOUR	137	DORP ST.	CENTRAL
GIVENGAIN	243	YES	-33.939740	18.852672	STOREY HOUSE	4	HEROLD ST.	CENTRAL
GLOBAL IMAGE	39	YES	-33.964282	18.839688	TECHNOSTELL BUILDING 2	11	QUANTUM ST.	TECHNOPARK
GRAFIXIT	19	YES	-33.964770	18.835566	INNOVATION CENTRE 1		MESON ST.	TECHNOPARK
GRASSROOTS GROUP	200		-33.964770	18.835566	INNOVATION CENTRE 1		MESON ST.	TECHNOPARK
GRETEL GERBER PROPERTIES	132	YES	-33.951554	18.852955		19	SWELLENGREBEL AVE.	DIE BOORD
GREY MATTER AT FINCH	321	NEW	-33.964469	18.840523		15	QUANTUM ST.	TECHNOPARK
GROENEWALDT ATTORNEYS	279		-33.935911	18.860636	EIKESTAD MALL		ANDRINGA ST.	CENTRAL
GRW TECHNOLOGIES	89		-33.965527	18.835968	TE DEUM BUILDING	3	MESON ST.	TECHNOPARK
GUARDIAN DEBT MANAGEMENT	9	YES	-33.939536	18.856643		98	DORP ST.	CENTRAL
HAUMANN SMAL DESIGN STUDIO	254	YES	-33.966214	18.836995	MOORE STEVENS VDA		TECHNO DR.	TECHNOPARK
HAYWARD LORETTA (ATTORNEYS)	70		-33.937164	18.860663	GOOD HOPE BUILDING	23	PLEIN ST.	CENTRAL
HELP U BOND: BOND ORGANISATION	238		-33.936021	18.862528	RYNEVELD PLAZA		RYNEVELD ST.	CENTRAL
HERMANSEN BURGESS ARCHITECTS	194		-	-		37	DORP ST.	CENTRAL
HEUER BATES TRUST	164		-33.930390	18.857970		69	BIRD ST.	CENTRAL
HEX DIAGNOSTICS	128		-33.964770	18.835566	INNOVATION CENTRE 1	5	MESON ST.	TECHNOPARK
HILTRON SYSTEMS	222		-33.939823	18.854627	BLACKHORSE CENTRE		MARKET ST.	CENTRAL
HORN & DE KONING DEVELOPMENTS	245	YES	-33.964836	18.837992	TIMES SQUARE		ELECTRON ST.	TECHNOPARK
HUGO LOTTER ARCHITECTS	35	YES	-33.964282	18.839688		9	QUANTUM ST.	TECHNOPARK
HUMAN LOGIC RECRUITMENT AGENCY	280		-33.938007	18.861031	DE WET CENTRE		CHURCH ST.	CENTRAL
I TO I TECHNOLOGIES	120		-33.965928	18.839959	CARPE DIEM OFFICE PARK		QUANTUM ST.	TECHNOPARK
IBN CONSULTING AND IMMIGRATION	12	YES	-33.939823	18.854627	BLACK HORSE CENTRE		DORP & MARK ST.	CENTRAL
ICE GROUP BOLAND	116	YES	-33.964836	18.837992	TIMES SQUARE		ELECTRON ST.	TECHNOPARK
ID ADVERTISING & COMMUNICATIONS	281		-33.940660	18.849582	INANDA BUILDING	6	DORP ST.	CENTRAL
IMALIVEST	49	YES	-33.965214	18.839033		17	TERMO ST.	TECHNOPARK

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
IMQS SOFTWARE	38	YES	-33.964836	18.837992		11	ELECTRON ST.	TECHNOPARK
IN 2 ONE SA	45	YES	-33.964836	18.837992	OCTO PLACE	D2	ELECTRON ST.	TECHNOPARK
INALA TECHNOLOGIES	18	YES	-33.965586	18.836465		1A	MESON ST.	TECHNOPARK
INDEPENDENT SECURITIES	60		-33.938650	18.862277		153	DORP ST.	CENTRAL
INDEPENDENT TRUSTEES	145		-33.978712	18.840962	BLAAUWKIP OFFICE PARK		WEBERSVALLEI RD.	JAMESTOWN
INDEVCO BUSINESS CONSULTANTS	205		-33.935166	18.863725	DIE SKUINSHUIS		RYNEVELD ST.	CENTRAL
INDUTECH DEVELOPMENT	282		-33.926096	18.878166	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
INTERNATIONAL PLAYER MANAGEMENT	206		-33.941782	18.832451		11	NAGTEGAAL ST.	ONDERPAPEGAAIBERG
IPHOTOGRAPHIC	273	NEW	-33.935166	18.863725	DIE SKUINSHUIS		RYNEVELD ST.	CENTRAL
IQ RETAIL	51	YES	-33.965313	18.840555	RHINO HOUSE	23	QUANTUM ST.	TECHNOPARK
ISIVUNO ESDLE	283		-33.937164	18.860663	GOOD HOPE BUILDING	23	PLEIN ST.	CENTRAL
ISS	320	NEW	-33.962847	18.836844				TECHNOPARK
IT BLUE	312	NEW	-33.965928	18.839959	CARPE DIEM OFFICE PARK		QUANTUM ST.	TECHNOPARK
ITGUYZ	94		-33.938309	18.861901	ANDMAR BUILDING	41	CHURCH ST.	CENTRAL
JACOBS, BELINDA (ATTORNEY)	207		-33.938065	18.867615		5	RATTRAY LANE	MOSTERTSDRIFT
JEFFERSON C WEDGEWOOD WINE	223	YES	-33.934766	18.880320		40	JONKERSHOEK RD	MOSTERTSDRIFT
JINJA PUBLISHING	95		-33.938309	18.861901	ANDMAR BUILDING	41	CHURCH ST.	CENTRAL
JORDAAN ATTORNEYS	284		-33.940926	18.861743		3	RYNEVELD ST.	CENTRAL
JULIAN KRUGER PHOTOGRAPHIC SERVICES	224		-33.934454	18.829767		20	PATRY'S ST.	ONDERPAPEGAAIBERG
KAT & CO	113		-33.957064	18.857826	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
KIRFANE INVEST	225		-33.937020	18.862585	ECCLESIA BUILDING	71	PLEIN ST.	CENTRAL
KLOMP CONSULT WESTERN CAPE	102		-33.934765	18.880514		46	JONKERSHOEK RD	MOSTERTSDRIFT
KOEGELENBERG ATTORNEYS	285		-33.965214	18.839033		17	TERMO ST.	TECHNOPARK
LAKER & ASSOCIATES	208		-33.946128	18.853856	DOORNBOSCH CENTRE		STRAND RD	CENTRAL
LANGUAGE INC.	8	YES	-33.956984	18.857360	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
LANZERIKJ FINANCIAL SERVICES	174		-33.934784	18.860669	DE WAAL SENTRUM	77	ANDRINGA ST.	CENTRAL
LAZERCOR DEVELOPMENT	250	YES	-33.966304	18.837298	COTILLION PLACE		TECHNO DR.	TECHNOPARK
LDP (LOUBSER DU PLESSIS GROUP)	44	YES	-33.939559	18.861917	DE WATERKANT BUILDING		HELDERBERG ST.	CENTRAL
LEMONS INTO LEMONADE	226		-	-			WITHHELD	
LHA SYSTEMS	126	YES	-33.964957	18.835917	INNOVATION CENTRE 2		MESON ST.	TECHNOPARK
LINDA HUMAN & ASSOCIATES	157		-33.938435	18.863364		178	DORP ST.	CENTRAL
LOGISTA INC.	109	YES	-33.957064	18.857826	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
LOUBSER CH & SON	199		-33.966287	18.856393		31	LONGIFOLIA ST.	PARADYSKLOOF
LOURENS ATTORNEYS	101		-33.933865	18.837748	LANZERAC MANOR		JONKERSHOEK RD.	MOSTERTSDRIFT
LS ENTERPRISES	309	NEW	-33.943250	18.834783	THE VINEYARD CENTRE		DEVON VALLEY RD.	DEVON VALLEY
LUCILLE GELDENHUYS ATTORNEY	166		-33.938007	18.861031	DE WET CENTRE		BIRD & CHURCH ST.	CENTRAL
MA GROUP HOLDINGS	323		-33.938191	18.861714		35	CHURCH ST.	CENTRAL
MARAIS JOHANN & ASSOCIATES	155		-33.938964	18.853352		18	PAPEGAAI ST.	CENTRAL
MARAIS MULLER YEKISO	286		-33.943414	18.851212	OEWERPARK	21	ROKEWOOD AVE.	DIE BOORD
MARITE PROPERTY MANAGEMENT	287		-33.939121	18.858385		107	DORP ST.	CENTRAL
MARTI VAN REENEN	196		-33.967472	18.855700		15	GRANDICEPS ST.	PARADYSKLOOF
MBB CONSULTING ENGINEERS	288		-33.940178	18.852893	DE HOOP BUILDING	34	DORP ST.	CENTRAL
MBV CONSULTING GROUP	289		-33.965431	18.836389	MBV TRUST BUILDING	UNIT 1	MESON ST.	TECHNOPARK
MDV PROTECT MANAGEMENT	103		-33.951712	18.862348		1	HOOG ST.	DALSIG
MEDI-CLINIC REGIONAL HEAD OFFICE	290		-33.956219	18.856540			STRAND RD.	CENTRAL
MEDIUM TERM FORECASTING ASSOCIATES	231	YES	-33.937034	18.860098	ANGLO AFRICAN BUILDING	4	PLEIN ST.	CENTRAL
MEMORPHIC SA	25	YES	-33.935549	18.859085	DROSTDY CENTRE	15	BIRD ST.	CENTRAL
MERIDIAN REALTY	291		-33.942511	18.859730	VALERIDA BUILDING		PIET RETIEF ST.	KRIGEVILLE
MESA SOLUTIONS	292		-33.934566	18.886753		5	THIERRY ST.	MOSTERTSDRIFT
METROPOLITAN LIFE	293		-33.935911	18.860636	EIKESTAD MALL		ANDRINGA ST.	CENTRAL
MGC INDUSTRIAL PROJECTS	29	YES	-33.966304	18.837298	COTILLION PLACE		TECHNO DR.	TECHNOPARK
MGP	209		-33.948452	18.865744		9	STELLENBERG AVE.	WELGELEGEN
MOLLER C & ASSOCIATES	193		-33.956535	18.870505		17	MAZOT ST.	BRANDWACHT
MOOIRIVIER BROKERS	99		-33.934946	18.878915		41	JONKERSHOEK RD.	MOSTERTSDRIFT
MOONSTONE INFORMATION REFINERY	294		-33.942511	18.859730	VALERIDA BUILDING		PIET RETIEF ST.	CENTRAL
MOORE STEPHENS	105	YES	-33.966214	18.836995	MOORE STEPHENS VDA		TECHNO DR.	TECHNOPARK
MULTENET TECHNOLOGIES	180		-33.943250	18.834783	THE VINEYARD CENTRE		DEVON VALLEY &	DEVON VALLEY
MUSTARD SEED RELATIONSHIP MARKETING	146		-33.978712	18.840962	BLAAUWKLIP OFFICE PARK	UNIT 1	WEBERSVALLEI RD.	JAMESTOWN
MUTUAL & FEDERAL INSURANCE COMPANY	210		-33.978712	18.840962	BLAAUWKLIP OFFICE PARK		WEBERSVALLEI RD.	JAMESTOWN
MV ASSET MANAGEMENT	88	YES	-33.965313	18.840555		23	QUANTUM ST.	TECHNOPARK
MXIT	324		-33.956763	18.858301	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
NANOSEF LABORATORIES	183		-33.938203	18.848790	OUDE MOLEN BUILDING		DISTILLERY RD.	ONDERPAPEGAAIBERG
NAUDE EN BOUMA	168	YES	-33.966063	18.835539		155	DORP ST.	CENTRAL
NMCM RETAIL INVESTMENTS	159	YES	-33.945659	18.846421		38	SAFFRAAN LANE	DIE BOORD

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
NTC GLOBAL	295		-33.964770	18.835566	INNOVATION CENTRE 1		MESON ST.	TECHNOPARK
OAKLANDS WINE EXPORTERS	296		-33.946128	18.853856			STRAND RD	CENTRAL
O'CONNELL BARNARD ATTORNEY	160		-33.966250	18.838920	TITAN HOUSE	3	TERMO ST.	TECHNOPARK
OLD MUTUAL	162		-33.936686	18.859494		40	BIRD ST.	CENTRAL
ONE DIGITAL MEDIA	297		-33.966460	18.838159		18	TECHNO DR.	TECHNOPARK
OOSTHUIZEN & CO.	298		-33.937034	18.860098	ANGLO AFRICAN BUILDING	4	PLEIN ST.	CENTRAL
OPS LOGIK SYSTEMS	27	YES	-33.965431	18.836389		1	MESON ST.	TECHNOPARK
PAY AT SERVICES	1	YES	-33.938191	18.861714	OLD COLLEGE BUILDING	35	CHURCH ST.	CENTRAL
PD CARINUS ATTORNEYS	75	YES	-33.940143	18.856650		18	KRIGE ST.	CENTRAL
PEACE PARKS FOUNDATION	13	YES	-33.942594	18.847263	MILLENIA PARK	16	STELLENBERG AVE.	CENTRAL
PEGASYS ENERGY MANAGEMENT SYSTEMS	80	YES	-33.965313	18.840555	CARPE DIEM OFFICE PARK		QUANTUM ST.	TECHNOPARK
PERIDOT COMMUNICATIONS	50		-	-		43	SIMONSBERG ST.	DEVON VALLEY
PERNOT RICARD SA	299		-33.966304	18.837298	COTILLION PLACE		TECHNO DR.	TECHNOPARK
PETER VILJOEN FINANCIAL	143		-33.935905	18.878004		26	VAN DER STEL ST.	MOSTERTSDRIFT
PFS CONSULTANTS	325		-33.939121	18.858385		107	DORP ST.	CENTRAL
PIETER STEENKAMP / PERITUS TRUST	84	YES	-33.938191	18.861714	OLD COLLEGE BUILDING	35	CHURCH ST.	CENTRAL
PLANTECH CONSULTING ENGINEERS	129		-33.966460	18.838159		18	TECHNO DR.	TECHNOPARK
PMG AFRICA / VENFIN	119		-33.965788	18.840559		25	QUANTUM ST.	TECHNOPARK
PRICE WATERHOUSE COOPERS (PWC)	36	YES	-33.943414	18.851212	OEWERPARK		ROKEWOOD AVE.	DIE BOORD
PROPERTYPRO	69	YES	-33.937111	18.860817		27	PLEIN ST.	CENTRAL
PROPTUNITY DEVELOPMENTS	179		-	-		8	DROSTDY ST.	CENTRAL
PROTEK ELECTRONIC SYSTEMS	177		-33.966100	18.854970			CINEROID ST.	PARADYSKLOOF
PROTEKMA INSURANCE BROKERS	111		-33.956774	18.858407	BRANDWACHT OFFICE		TRUMALI ST.	BRANDWACHT OFFICE
PSG KONSULT FINANCIAL PLANNING	87	YES	-33.938191	18.861714	OLD COLLEGE BUILDING	35	CHURCH ST.	CENTRAL
PW EKSTEEN ACCOUNTANT	175		-33.934784	18.860669	DE WAAL CENTRE		ANDRINGA ST.	CENTRAL
QUAD AFRICA CONSULTING	20	YES	-33.964836	18.837992	TIMES SQUARE		ELECTRON ST.	TECHNOPARK
RANK PROPERTY ADMINISTRATORS	176		-33.938007	18.861031	DE WET CENTRE		CHURCH ST.	CENTRAL
RAUTENBACH LOTZ DU TOIT & KORF	142		-33.934856	18.832313		14	TROUPANT LANE	ONDERPAPEGAAIBERG
RBI CAPITAL	65		-33.939536	18.856643		98	DORP ST.	CENTRAL
REAL CONNECT	300		-33.964957	18.835917	INNOVATION CENTRE 2		MESON ST.	TECHNOPARK
RESOURCE & DEVELOPMENT FOUNDATION	198		-33.960216	18.854207		1	PARADYSKLOOF RD.	PARADYSKLOOF
RETIEF KRIGE INDUSTRIAL DESIGN	127		-33.964957	18.835917	INNOVATION CENTRE 2		MESON ST.	TECHNOPARK

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
REUTECH RADAR SYSTEMS (RRS)	249	YES	-33.963791	18.834262		35	ELECTRON ST.	TECHNOPARK
RHOTECH	100		-33.924464	18.880266		6	KAHLER ST.	IDAS VALLEY
RUBIX CREATIVE LOGIC	301		-33.939639	18.855973		55	DORP ST.	CENTRAL
RUDOLPH BAARD CONSULTING	211		-33.966250	18.838920		3	TERMO ST.	TECHNOPARK
SA JOURNAL OF NATURAL MEDICINE	124		-33.966250	18.838920	TITAN HOUSE		TERMO ST.	TECHNOPARK
SACO SYSTEMS	186		-33.963791	18.834262		37 - ?	ELECTRON ST.	TECHNOPARK
SCHALK PIENAAR ARCHITECT	107		-33.963777	18.856109		7	FLORIDA ST.	PARADYSKLOOF
SCHEMA INVESTMENTS	76		-33.938301	18.851858		15	KRIGE ST.	CENTRAL
SCHNEEBERGER ASSOCIATES	302		-33.940852	18.837660	BABERNET	33	OUDE LIBERTAS ST.	ONDERPAPEGAAIBERG
SD THOMPSON CONSULTANTS	138		-33.932986	18.890849			WATER WEG	ROZENDAL
SEDA	212	YES	-33.935911	18.860636	EIKESTAD MALL		ANDRINGA ST.	CENTRAL
SELFORDS	93		-33.938309	18.861901	ANDMAR BUILDING	41	CHURCH ST.	CENTRAL
SFI INVESTMENTS	326		-33.935911	18.860636	EIKESTAD MALL		ANDRINGA ST.	CENTRAL
SHIBBOLET PROPERTIES & ESTATES	303		-33.925120	18.855620		208	BIRD ST.	CENTRAL
SIPPEL & DE LANGE	118	YES	-33.966206	18.836590			ELECTRON ST.	TECHNOPARK
SLC DEVELOPMENT SERVICES	192		-33.939755	18.852584		3	HEROLD ST.	CENTRAL
SLC PROPERTY GROUP	237	NEW	-33.938460	18.860240		3 OR 5	BIRD ST.	CENTRAL
SLEE + CO ARCHITECTS	64		-33.939135	18.858243		101	DORP ST.	CENTRAL
SMC BRANDS SA	188		-33.943250	18.834783	THE VINEYARD CENTRE		DEVON VALLEY &	DEVON VALLEY
SMUTS & DE KOCK ARCHITECTS	304		-33.939893	18.855336		63	DORP ST.	CENTRAL
SNOWBALL EFFECT	305		-33.963180	18.839566	DATA VOICE HOUSE	16	ELECTRON ST.	TECHNOPARK
SOFTMAR SA	2	YES	-33.938656	18.862360		157	DORP ST.	CENTRAL
SPACE AGE TECHNOLOGIES	251	YES	-33.935549	18.859085	DROSTDY CENTRE		BIRD ST.	CENTRAL
SPECTRA-MEDIC	42	YES	-33.964440	18.839584		8	QUANTUM ST.	TECHNOPARK
SPENCE & TYMBIOS QUANTITY SURV.	197		-33.938507	18.851242		23	WEIDENHOF ST.	CENTRAL
SPESCOM DATAVOICE	306		-33.963180	18.839566	DATA VOICE HOUSE	16	ELECTRON ST.	TECHNOPARK
STARLIGHT STUDIOS (SIPS)	165		-33.935549	18.859085	DROSTDY CENTRE		BIRD ST.	CENTRAL
STEINHOFF	272	NEW	-33.964469	18.840523			QUANTUM ST.	TECHNOPARK
STELLAND FINANSIES	21	YES	-33.935063	18.859312		98A	BIRD ST.	CENTRAL
STELLENBOSCH FINANCIAL SERVICES	33	YES	-33.940414	18.856643		12	KRIGE ST.	CENTRAL
STELLENBOSCH MANAGEMENT SERVICES	270	NEW	-33.935166	18.863725	DIE SKUINSHUIS		RYNEVELD ST.	CENTRAL
STELLOANS	172		-33.934508	18.860607	JUBILEE ARKADE	87	ANDRINGA ST.	CENTRAL

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
STRAUSS DALY ATTORNEYS	239	NEW	-33.938440	18.860220		3 OR 5	BIRD ST.	CENTRAL
SUID AFRIKAANSE WYN BEDRYFRAAD	63		-33.938753	18.861078	DIACONIES HOUSE	156	DORP ST.	CENTRAL
SUN SPACE AND INFORMATION SYSTEMS	40	YES	-33.964135	18.838183	ELECTRON HOUSE	15	ELECTRON ST.	TECHNOPARK
SUNFLOOD	34	YES	-33.966304	18.837298	COTILLION PLACE		TECHNO DR.	TECHNOPARK
SWIST TECH SOLUTIONS	230		-33.957185	18.858234	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
SYGADE SOLUTIONS	85		-33.964414	18.838937	QUANTUM HOUSE	6	QUANTUM ST.	TECHNOPARK
SYNEXUS	189		-33.943250	18.834783	THE VINEYARD CENTRE		DEVON VALLEY &	DEVON VALLEY
TALJAARD, MEYER & STORM	4	YES	-33.934784	18.860669	DE WAAL SENTRUM		ANDRINGA ST.	CENTRAL
TECHNOPARK AUTOMATION & CONTROL	92	YES	-33.967305	18.840051			TECHNO DR.	TECHNOPARK
TENK LOUBSER ASSOCIATES	22	YES	-33.942594	18.847263	MILLENNIA PARK	16	STELLENBERG AVE.	CENTRAL
TERTIUS MAREE & ASSOCIATES	229		-33.956984	18.857360	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
TF DESIGN (TFD)	187		-33.940892	18.827481		UNIT 1	DEVON VALLEY RD	DEVON VALLEY
THE BOY NEXT DOOR DESIGN	308		-33.981900	18.852574		38	TIOBELLE CRESCENT	JAMESTOWN
THE FAMOUS IDEA TRADING CO.	158		-33.942594	18.847263	MILLENNIA PARK	16	STELLENBERG AVE.	CENTRAL
THEMBEKA CAPITAL	170		-33.940660	18.849582		6	DORP ST.	CENTRAL
THERON & ASSOCIATES	154		-33.936384	18.865856	HUIS THERON	14	NEETHLING ST.	CENTRAL
THORNBURN SECURITY SOLUTIONS	52	YES	-33.965313	18.840555	CARPE DIEM OFFICE PARK	11	QUANTUM ST.	TECHNOPARK
THURA BROKER SERVICES	112		-33.956774	18.858407	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
TIM ZIEHL ARCHITECTS	78	YES	-33.939823	18.854627	BLACK HORSE CENTER		DORP ST. & MARK	CENTRAL
TRACKS FOR AFRICA	10	YES	-33.942594	18.847263	MILLENNIA PARK	16	STELLENBERG AVE.	CENTRAL
TV3	310		-33.938692	18.854793	VAN DER BIJL HOUSE	37	MARKET ST.	CENTRAL
UPFRONT SYSTEMS	311		-33.964770	18.835566	INNOVATION CENTRE 1	9	MESON ST.	TECHNOPARK
VAN BILJON & VISSER ARCHITECTS	242	YES	-33.962890	18.837480		21	ELECTRON ST.	TECHNOPARK
VAN ROOYEN MARIEKE ATTORNEYS	150		-33.938698	18.861949		151	DORP ST.	CENTRAL
VGW ATTORNEYS	236		-33.956984	18.857360	BRANDWACHT OFFICE PARK		TRUMALI ST.	BRANDWACHT
VIKING MARKETING	30	YES	-33.927332	18.852810		6	STOFFEL SMIT ST.	PLANKENBURG
VINCORP	213		-33.937316	18.862948		19	RYNEVELD ST.	CENTRAL
VINLAB	241	YES	-33.938203	18.848790	OUDE MOLEN BUILDING		DISTILLERY RD	ONDERPAPEGAAIBERG
WALMART GLOBAL SOURCING SA	125	YES	-33.966250	18.838920	TITAN HOUSE	4	TERMO ST.	TECHNOPARK
WALTERS ATTORNEYS	148	YES	-33.935911	18.860636	EIKESTAD MALL		ANDRINGA ST.	CENTRAL
WAM TECHNOLOGY	149		-33.935911	18.860636	EIKESTAD MALL		ANDRINGA ST.	CENTRAL
WATER ANALYTICAL LABORATORY	151		-33.925075	18.876375		3	HULETT STREET	PLANKENBRUG

COMPANY	ID	PARTICIPANT	Y-COORD.	X-COORD.	OFFICE/BUILDING	STR. NR.	STREET NAME	SUBURB
WESTERNSCAPE ANIMAL PRODUCTION	181		-33.932746	18.864700	DEPT. OF AGRICULTURE			UNIVERSITY CAMPUS
WINES OF SA	62	YES	-33.939679	18.862053		8	HELDERBERG ST.	CENTRAL
WITHERS ENVIRONMENTAL CONSULTANTS	48	YES	-33.925906	18.857248		15	MOUNT ALBERT ST.	LA COLLINE
WJB ONDERNEMINGS	152		-33.937270	18.851820		25	HEROLD ST.	CENTRAL
WOLHUTER ASSOCIATES	91		-33.966460	18.838159		18	TECHNO DR.	TECHNOPARK
WORD WIDE FUND FOR NATURE SA	47	YES	-33.942594	18.847263	MILLENNIA PARK	16	STELLENBERG AVE.	CENTRAL
WORKFORCE GROUP HOLDINGS	153		-33.925807	18.850038		2	BRIDGE RD	PLANKENBRUG
WSP AFRICA COASTAL ENGINEERS	313		-33.938191	18.861714	OLD COLLEGE BUILDING	35	CHURCH ST.	CENTRAL
WYNLAND PROPERTIES	74	YES	-33.939699	18.856514		75	DORP ST.	CENTRAL
YELLOWWOOD BRAND ARCHITECTS	314		-33.966304	18.837298	COTILLION PLACE		TECHNO DR.	TECHNOPARK
ZEDER INVESTMENTS	315		-33.938191	18.861714	OLD COLLEGE BUILDING	35	CHURCH ST.	CENTRAL

APPENDIX E: CHAPTER 5 ADDITIONAL STATISTICS

Table E.1 The importance of locational factors according to branch type³³

FACTORS INFLUENCING THE CHOICE OF STELLENBOSCH AS BUSINESS LOCATION	SINGLE BRANCH	NATIONAL BRANCH	NATIONAL HEAD OFFICE	INTERNATIONAL BRANCH	INTERNATIONAL HEAD OFFICE
Stellenbosch is/was the owner/key role-player's hometown.	1.58	2	2	2.33	1.83
Stellenbosch is the closest location to the majority of your clients/customers.	2.22	1.88	2.63	1.33	2.67
Stellenbosch is the closest location to your most important clients/customers.	2.09	2.13	2.75	1.33	2.67
Stellenbosch is a location that attracts highly educated/specialist employees.	2.27	2.38	2.25	1.67	1.67
Stellenbosch has an excellent pool of highly educated specialists in your line of business.	2.29	2.25	2.63	1.67	1.83
Stellenbosch is a good location for finding highly-skilled university graduates.	2.33	2.38	2	2.33	2
Stellenbosch is closely situated to convenient transport links.	2.44	2.38	2.5	3	1.83
Stellenbosch is closely situated to Cape Town.	2.29	2.38	2.13	1.67	2
Stellenbosch has beautiful natural surroundings.	2.27	2.5	2.13	2	2.17
Stellenbosch has a good mix of social and cultural amenities.	2.36	2.38	2.25	2	2.17
Stellenbosch allows tax benefits.	2.91	2.63	2.88	3	3
Stellenbosch allows rent benefits.	2.89	2.63	2.88	2.67	2.9
Stellenbosch allows certain other financial benefits.	2.69	2.5	2.88	2.33	2.5
Stellenbosch is a university town.	2.51	2.5	2.38	2	2.5
Stellenbosch provides good public services.	2.62	2.63	2.88	2.33	2.33
Stellenbosch provides a better quality of life for employees.	2.27	2.38	2.13	2.2	1.67
Stellenbosch has an attractive/suitable climate.	2.33	2.5	2.25	2.2	2.33
Stellenbosch is safer than other areas in terms of crime.	2.27	2.5	2.25	1.8	2.17
Stellenbosch provides good primary/secondary education opportunities for employees' children.	2.18	2.38	2	2.33	2.33
Your business is closely situated to tertiary institutions (excl. the University).	2.42	2.13	2.38	2.33	2
Your business is closely situated to Research and Development institutions (e.g. CSIR).	2.62	2.38	2.5	2.67	2.17
Your business is closely situated to similar firms in the same industry.	2.6	2.63	2.63	2.33	2.67
Your business is situated at a prestigious address / office park.	2.63	2	2.13	1.67	2.5
Your business is closely situated to useful business networks.	2.38	2	2.38	1.33	2
Your business is closely situated to useful government resources.	2.73	2.38	2.75	2.67	2.5

Bold figures are referred to in discussion

³³ 1=crucial 2=beneficial 3=not important

Table E.2 The importance of locational factors according to relocation status³⁴

FACTORS INFLUENCING THE CHOICE OF STELLENBOSCH AS BUSINESS LOCATION	RELOCATED FROM OTHER TOWN	SECONDARY BRANCH	FIRST & ONLY BRANCH	FIRST BUT NOT ONLY BRANCH
Stellenbosch is/was the owner/key role-player's hometown.	2.17	2.2	1.55	1.75
Stellenbosch is the closest location to the majority of your clients/customers.	2.83	1.7	2.26	2.25
Stellenbosch is the closest location to your most important clients/customers.	2.83	1.7	2.14	2.42
Stellenbosch is a location that attracts highly educated/specialist employees.	2.17	2.2	2.26	2
Stellenbosch has an excellent pool of highly educated specialists in your line of business.	2.33	2.2	2.29	2.17
Stellenbosch is a good location for finding highly-skilled university graduates.	2.17	2.5	2.33	1.92
Stellenbosch is closely situated to convenient transport links.	2.5	2.5	2.45	2.17
Stellenbosch is closely situated to Cape Town.	2.17	2.1	2.26	2.25
Stellenbosch has beautiful natural surroundings.	2.33	2.3	2.24	2.25
Stellenbosch has a good mix of social and cultural amenities.	2.5	2.3	2.31	2.25
Stellenbosch allows tax benefits.		2.7	2.9	2.92
Stellenbosch allows rent benefits.		2.6	2.88	2.92
Stellenbosch allows certain other financial benefits.		2.3	2.69	2.67
Stellenbosch is a university town.	2.83	2.4	2.5	2.25
Stellenbosch provides good public services.	2.67	2.5	2.62	2.67
Stellenbosch provides a better quality of life for employees.	2.17	2.4	2.21	2
Stellenbosch has an attractive/suitable climate.	2.33	2.3	2.31	2.42
Stellenbosch is safer than other areas in terms of crime.	2.33	2.3	2.24	2.33
Stellenbosch provides good primary/secondary education opportunities for employees' children.	2.33	2.3	2.17	2.17
Your business is closely situated to tertiary institutions (excl. the University).	2.83	2.2	2.4	2
Your business is closely situated to Research and Development institutions (e.g. CSIR).		2.4	2.6	2.25
Your business is closely situated to similar firms in the same industry.		2.6	2.6	2.42
Your business is situated at a prestigious address / office park.	2	2	2.38	2.25
Your business is closely situated to useful business networks.	2.33	1.9	2.38	2.08
Your business is closely situated to useful government resources.	2.83	2.4	2.74	2.58

Bold figures are referred to in discussion

³⁴ 1=crucial 2=beneficial 3=not important
